Wave propagation before and after the floor work in the OEB in 2010

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SUMMARY

Recently the south-west side trenches under and in front of the wave makers in the OEB have been permanently filled-up to provide a homogeneous bottom and uniform water depth all over the basin. This work is to understand the improvement of the wave quality after the floor work. Two sets of experimental data comprised of mono- and bi-chromatic waves before and after the floor work are compared to identify the impact of the development work on the wave generation and propagation in the OEB. Results are compared between the measured wave data, before and after the floor work in the OEB. Results are shown in terms of surface elevations and wave energies propagations for measured waves, primary waves, bounded waves and unwanted second order free waves. In most of the cases it is observed from the results that the shallower the wave the better the wave quality after the floor work.

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ABSTRACT

Recently the south-west side trenches under and in front of the wave makers in the OEB have been permanently filled-up to provide a homogeneous bottom and uniform water depth all over the basin. Two sets of experimental data comprised of mono- and bi-chromatic waves before and after the floor work are compared to identify the impact of the development work on the wave generation and propagation in the OEB. Results are compared between the measured wave data, before and after the floor work in the OEB. Results are shown in terms of surface elevations and wave energies propagations for measured waves, primary waves, bounded waves and unwanted second order free waves. In most of the cases it is observed from the results that the shallower the wave the better the wave quality after the floor work.

1.0 INTRODUCTION

The OEB at NRC-IOT is a world class 3D experimental wave basin. Recently the small trenches under and in front of the south and west side wave makers were filled-up to produce a uniform floor bottom. It is important to study the impact of this work on the wave quality in the basin.

In this work two sets of experimental data are used. The first set (called **before** from now on) of wave data was obtained from the experimental work before the trenches were filled-up and the second set (called **after** from now on) of data was obtained from the experiment after the trenches were filled up. In the experiments both mono- and bi-chromatic wave are considered for different water depths. Four different water depths were also used, 0.4m, 0.5m, 0.6m and 0.8m. Comparisons of the data were done for identical wave conditions.

2.0 DESCRIPTION OF THE TRENCHES AND FILLED-UP WORK

The south trench was about 64m long, 0.4m wide and 0.3m deep. The west trench was about 26m long, 0.4m wide and 0.3m deep. These trenches are permanently filled-up.

3.0 EXPERIMENTAL SETUP

The experiment was carried out at the Offshore Engineering Basin of National Research Council Canada, Institute for Ocean Technology. The top view of the basin is shown in Fig. 1. The Offshore Engineering Basin is 75 m long x 32 m wide. 56 independently controlled segmented wave generators installed on the west wall generated the waves. Each segmented wave generator is 2 m high and 0.5 m wide. Passive absorbers, made of expanded metal sheets with varying porosities and spacing, are installed on the east wall. A solid metal wall is used to cover the north side of the basin.

During the experiment, 14 wave probes (P-1 to P-14) are installed as shown in Fig. 1. But for 0.8m water depth only 10 wave probes are used. The dotted lines in Fig. 1 show the location of the trenches in the OEB that the basin previously had. Table-1 measured the location of the wave probes throughout the basin. All the wave probes are capacitance type. All the data was acquired using GDAC (GEDAP Data Acquisition and Control) client-server acquisition system, developed by National Research Council Canada, Institute for Ocean Technology.

4.0 EXPERIMENTS AND DATA ACQUISITIONS

Experiments were carried out in three times slots: in October 2009 (PJ2298) with the presence of the trenches, in July 2010 (PJ2414) and in August 2011 (PJ2298) without trenches. In July 2010 experiments are carried out for both mono- and bi-chromatic waves on water depths 0.4m, 0.5m and 0.6m and in August 2011 experiments with 0.8m water depth are carried out. In the experiment of October 2009 all above water depths are used.

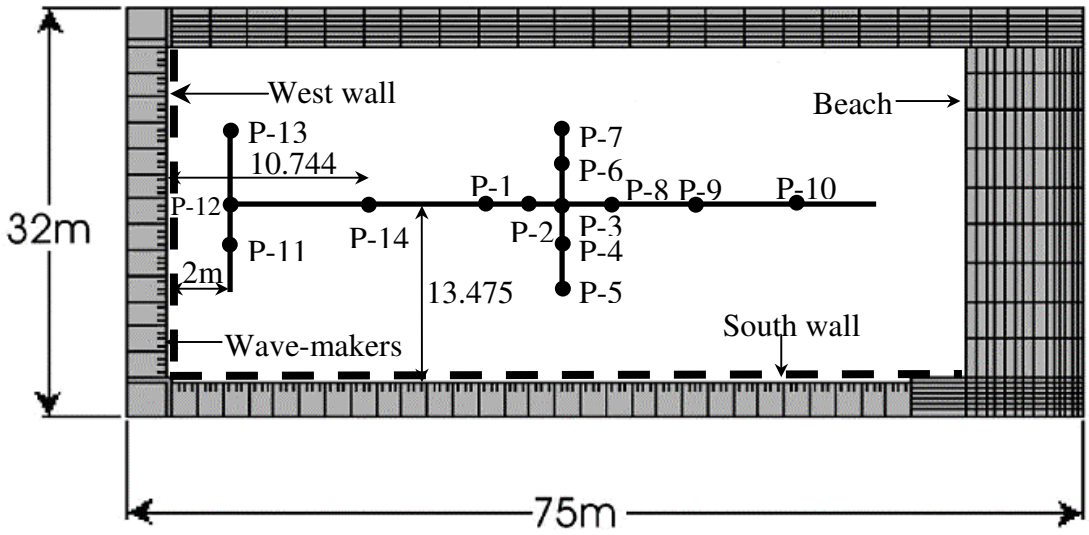

Fig. 1: Layout of the experimental tank (not to scale)

Table 1 Location of the wave probes in the OEB

No of the probe	Distance from the west wall (m)	Distance from the south wall (m)
1	26.891	13.475
2	27.221	13.475
3	27.731	13.475
4	27.731	12.955
5	27.731	12.635
6	27.731	14.825
7	27.731	18.365
8	29.081	13.475
9	32.621	13.475
10	41.621	13.475
11	2.0	12.635
12	2.0	13.475
13	2.0	18.365
14	10.744	13.475

5.0 INCIDENT WAVE CONDITIONS

In the experiments both mono- and bi-chromatic waves of different wave periods, wave heights and water depths are used. See Zaman and Mak (2007) and Zaman et al (2010) for several cases of mono- and bi-chromatic waves before the floor work. Table 2 to 5 show different incident wave conditions that we used in the experiments. In the tables below T_1 and T_2 are wave periods, H_1 and H_2 are the wave heights, h is the water depth, L is the wave length and h/L is the relative water depth.

Table 2a Mono-chromatic incident wave parameters (*h=0.4m*)

	T_1 (s)	H_1 (m)	h(m)	h/L
M4-1	2.145	0.08	0.4	0.100
M4-2	3.116	0.06	0.4	0.067
M4-3	4.105	0.06	0.4	0.050
M4-4	3.116	0.12	0.4	0.067
M4-5	4.105	0.16	0.4	0.050

Table 2b Bi-chromatic incident wave parameters (*h=0.4m*)

	T_1 (s)	h(m)	H_1 (m)	T_2 (s)	H_2 (m)	h/L
B4-1	1.25	0.4	0.06	1.17	0.06	0.195
B4-2	1.55	0.4	0.06	1.45	0.06	0.146
B4-3	2.22	0.4	0.06	2.00	0.06	0.096

Table 3a Mono-chromatic incident wave parameters (*h=0.5m*)

	T_1 (s)	H_1 (m)	h(m)	h/L
M5-1	1.977	0.04	0.5	0.125
M5-2	1.977	0.08	0.5	0.125
M5-3	2.829	0.06	0.5	0.083
M5-4	3.704	0.08	0.5	0.056

Table 3b Bi-chromatic incident wave parameters (*h=0.5m*)

	T_1 (s)	h(m)	H_1 (m)	T_2 (s)	H_2 (m)	h/L
B5-1	1.25	0.4	0.06	1.17	0.06	0.195
B5-2	1.55	0.4	0.06	1.45	0.06	0.146
B5-3	2.22	0.4	0.06	2.00	0.06	0.096

Table 4a Mono-chromatic incident wave parameters (*h=0.6m*)

	T_1 (s)	H_1 (m)	h(m)	h/L
M6-1	0.9	0.06	0.6	0.476
M6-2	1.0	0.06	0.6	0.390

Table 4b Bi-chromatic incident wave parameters (*h=0.6m*)

	T_1 (s)	h(m)	H_1 (m)	T_2 (s)	H_2 (m)	h/L
B6-1	1.55	0.4	0.06	1.45	0.06	0.146
B6-2	2.22	0.4	0.06	2.00	0.06	0.096

Table 5a Mono-chromatic incident wave parameters (*h=0.8m*)

	T_1 (s)	H_1 (m)	h(m)	h/L
M8-1	2.370	0.06	0.8	0.133
M8-2	3.035	0.08	0.8	0.100
M8-3	4.105	0.06	0.8	0.071

Table 5b Bi-chromatic incident wave parameters (*h=0.8m*)

	T_1 (s)	h(m)	H_1 (m)	T_2 (s)	H_2 (m)	h/L
B8-1	1.00	0.8	0.06	0.90	0.06	0.516
B8-2	1.55	0.8	0.02	1.45	0.02	0.236
B8-3	1.55	0.8	0.08	1.45	0.08	0.236
B8-4	2.12	0.8	0.08	2.02	0.08	0.153
B8-5	2.22	0.8	0.08	2.00	0.08	0.144
B8-6	3.33	0.8	0.08	2.85	0.08	0.090

The bottom of the basin was flat and the blanking plates were deployed to cover the north beach.

6.0 DATA ANALYSES

We have analyzed two sets of data, one for **before** the floor work and the other one is **after** the floor work. Different wave conditions and water depths are considered as shown in Tables 2 to 5. All the data are compared and the results are shown in terms of surface elevations and wave energies across the wave tank at probes 5-4-3-6-7 (Probe-5, Probe-4, Probe-3, Probe-6 and Probe-7) and at probes 11-12-13-14 (Probe-11, Probe-12, Probe-13 and Probe-14) and along the tank at probes 1-2-3-8-9-10 (Probe-1, Probe-2, Probe-3, Probe-8, Probe-9 and Probe-10), see Fig. 1. Data at Probes 10, 11, 12, 13 and 14 are not available for 0.8m water depth.

6.1 COMPARISONS - 1: Monochromatic waves

Table 2a, 3a, 4a and 5a respectively, show the incident wave conditions for monochromatic waves, respectively on 0.4m (M4), 0.5m (M5), 0.6m (M6) and 0.8m (M8) water depths. All the above cases are run with and without trenches condition in front of the south and west wave makers of the OEB. Comparisons of the results are made between both cases, with and without trenches.

Figs. 2a to 6g show surface elevations for the mono-chromatic waves for 0.4m water depth mentioned in Table 2a. Measured water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7 and 11-12-13-14 and at the along-tank probes 1-2-3-8-9-

10 are plotted together to show the differences in the wave amplitudes after and before the floor work. On the other hand, Figs. 30a to 34*l* show the wave energies of the measured waves, isolated primary waves (PW), bounded waves (BW) and other unwanted second order free waves like, free waves1 (FW1) and free waves2 (FW2) at the above probes locations. FW1 is reproduced due to the mismatch of the boundary conditions at the wave paddle and FW2 appears due to the displacement of the wave paddle from its zero position.

Figs. 7a to 10g show surface elevations for the monochromatic waves for 0.5m water depth mentioned in Table 3a. Acquired water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7 and 11-12-13-14 and at the along-tank probes 1-2-3-8-9-10 are plotted together to show the differences of the wave amplitudes after and before the floor work. On the other hand, Figs. 35a to 38*l* show the wave energies of the measured waves, PW, BW, FW1 and FW2 at the above probes locations.

Figs. 11a to 12g show surface elevations for the monochromatic waves for 0.6m water depth mentioned in Table 4a. Obtained water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7 and 11-12-13-14 and at the along-tank probes 1-2-3-8-9-10 are plotted together to show the differences of the wave amplitudes after and before the floor work.

Figs. 13a to 15d show surface elevations for the monochromatic waves for 0.8m water depth mentioned in Table 5a. Measured water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7 and 11-12-13-14 and at the along-tank probes 1-2-3-8-9-10 are plotted together to show the differences of the wave amplitudes after and before the floor work. On the other hand, Figs. 39a to 41h show the wave energies of the measured waves, PW, BW, FW1 and FW2 at the above probes locations. We don't have enough data for other probes for this case.

It is observed from the results that the smaller the relative water depth h/L (*i.e.* shallower the wave) the better the wave quality after the floor work. For shallower wave at probes 5-4-3-6-7, one can see from the above results that the magnitude of the wave crests and wave troughs become closer after the floor work. It is also noted that the shallower the wave the better the wave energies distributions across the tank for measured, primary, bounded and free waves for after cases. It is also perceived that the second order wave components are reduced for shallow waves after the floor work.

6.2 COMPARISONS - 2: Bichromatic waves

Table 2b, 3b, 4b and 5b respectively, show the incident wave conditions for Bi-chromatic waves on 0.4m (B4), 0.5m (B5), 0.6m (B6) and 0.8m (B8) water depths. Here also the above cases are run for: with and without trenches conditions in front of the south and west wave makers of the OEB. Results are again compared between both cases, with and without trenches. Results are compared in terms of surface elevations and wave energies across the wave tank at probes 5-4-3-6-7 (Probe-5, Probe-4, Probe-3, Probe-6 and Probe-7) and at probes 11-12-13-14 (Probe-11, Probe-12, Probe-13 and Probe-14) and along the tank at probes 1-2-3-8-9-10 (Probe-1, Probe-2, Probe-3, Probe-8, Probe-9

and Probe-10), see Fig. 1. Data at probes 10, 11, 12, 13 and 14 are not available for 0.8m water depth.

Figs. 16a to 18g show surface elevations for the bi-chromatic waves for 0.4m water depth. The incident wave parameters are mentioned in Table 2b. Obtained water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7, and 11-12-13-14 and at the along-tank probes 1-2-3-8-9-10 are plotted together to show the differences of the wave amplitudes after and before the floor works. On the other hand, Figs. 42a to 44*l* show the wave energies of the measured waves, PW, BW, FW1 and FW2 at the above probes locations. In the figures SPEC1 (0 to 1.0 Hz) and SPEC2 (0.9 to 1.5 Hz) are the wave energies that obtained from the measured wave data for given frequency ranges.

Figs. 19a to 21g show surface elevations for the bi-chromatic waves for 0.5m water depth. The incident wave parameters are mentioned in Table 3b. Acquired water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7, and 11-12-13-14 and at the along-tank probes 1-2-3-8-9-10 are plotted together to show the differences of the wave amplitudes after and before the floor works. On the other hand, Figs. 45a to 47*l* show the wave energies of the measured waves, PW, BW, FW1 and FW2 at the above probes locations.

Figs. 22a to 23g show surface elevations for the bi-chromatic waves for 0.6m water depth. The incident wave parameters are mentioned in Table 4b. Measured water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7, and 11-12-13-14 and at the along-tank probes 1-2-3-8-9-10 are plotted together to show the differences of the wave amplitudes after and before the floor works. On the other hand, Figs. 48a to 49*l* show the wave energies of the measured waves, PW, BW, FW1 and FW2 at the above probes locations.

Figs. 24a to 29g show surface elevations for the bi-chromatic waves for 0.4m water depth. The incident wave parameters are mentioned in Table 5b. Obtained water surface elevations, wave crests and troughs at across-tank probes 5-4-3-6-7 and at the along-tank probes 1-2-3-8-9 are plotted together to show the differences of the wave amplitudes after and before the floor works. On the other hand, Figs. 50a to 55*l* show the wave energies of the measured waves, PW, BW, FW1 and FW2 at the above probes locations.

7.0 LWAVE UTILIZATION

A NRC-IOT computer code LWAVE that can split a measured surface elevation data set into its component waves is used for the analysis. This code is utilized to isolate the primary waves, bounded second order waves and unwanted free waves from the raw measured data at every probe location. LWAVE can only isolate the component waves form the measured wave profiles. Another computer code called VSD is utilized to compute the energies of the individual wave component. More information and mathematical derivations on LWAVE can be found in Sand (1982), Barthel et al (1983), Sand and Mansard (1986) and Mansard et al (1987).

8.0 RESULTS

In this experiment 4 different water depths (*h= 0.4m, 0.5m, 0.6m* and *0.8m*) were used. The incident wave parameters are shown in Table 2 to Table 5 for mono- and bi-chromatic waves.

Results are compared between the measured wave data, before and after the floor work in OEB.

Appendix-I shows surface elevations, wave crests and wave troughs for monochromatic waves for all water depths at different probe locations.

Appendix-II shows surface elevations, wave crests and wave troughs for bi-chromatic waves for all water depths at different probe locations.

Appendix-III shows wave energies distributions at the across and at the along the tank probes for mono-chromatic waves on all water depths.

Appendix-IV shows wave energies distributions at the across and at the along the tank probes for bi-chromatic waves on all water depths.

Time lag can be observed in the plots that show surface elevations at different probe locations along the wave tank (Probes 1-2-3-8-9-10), see Figs. 2b, 16b, etc for example.

In some cases probes close (P-10 for example) to the beach show larger wave amplitudes due to the contamination by the reflected waves from the beach.

In several cases probes 6-7 show larger wave amplitude than other probes in the probes 5-4-3-6-7 array. This might be the reflection from the blanking wall [a solid metal wall is used to cover the north side of the basin]. See Fig. 1.

9.0 CONCLUSIONS

It is expected that when the floor of the OEB is completely flat then the wave quality for shallower waves would improve. The aim of this report is to identify and document the difference (before and after) if any, in the wave quality for wide range of waves. We have summarized this information. The presented figures are for different wave conditions and water depths to cover a wide range so that a reader can get a quick idea of the difference (before and after) for a particular wave of interest.

Comparisons of the results for surface elevations and energy propagations between the measured data before and after the floor work are shown. Deep water wave ($h/L \geq 0.5$) will not be affected by the floor and the wave starts to feel the bottom when the relative water depth (h/L) is less than 0.5. So the smaller the value of h/L means more the effects of the bottom on the propagating waves. It is observed from the results that the shallower the wave the better the wave quality after the floor work. For shallower wave at probes 5-4-3-6-7, one can see from the results that the magnitude of the wave crests and wave troughs become closer in after the floor work conditions. It is also perceived that the shallower the wave the better the wave energies distributions across the tank for primary, bounded and free waves for after cases. It is also found that the second order wave components are reduced for shallower waves in after the floor work conditions.

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APPENDIX – I

Surface elevations, wave crests and wave troughs for mono-chromatic waves

Probes array:

Probes: 5-4-3-6-7
Probes: 11-12-13-14
Probes 1-2-3-8-9-10

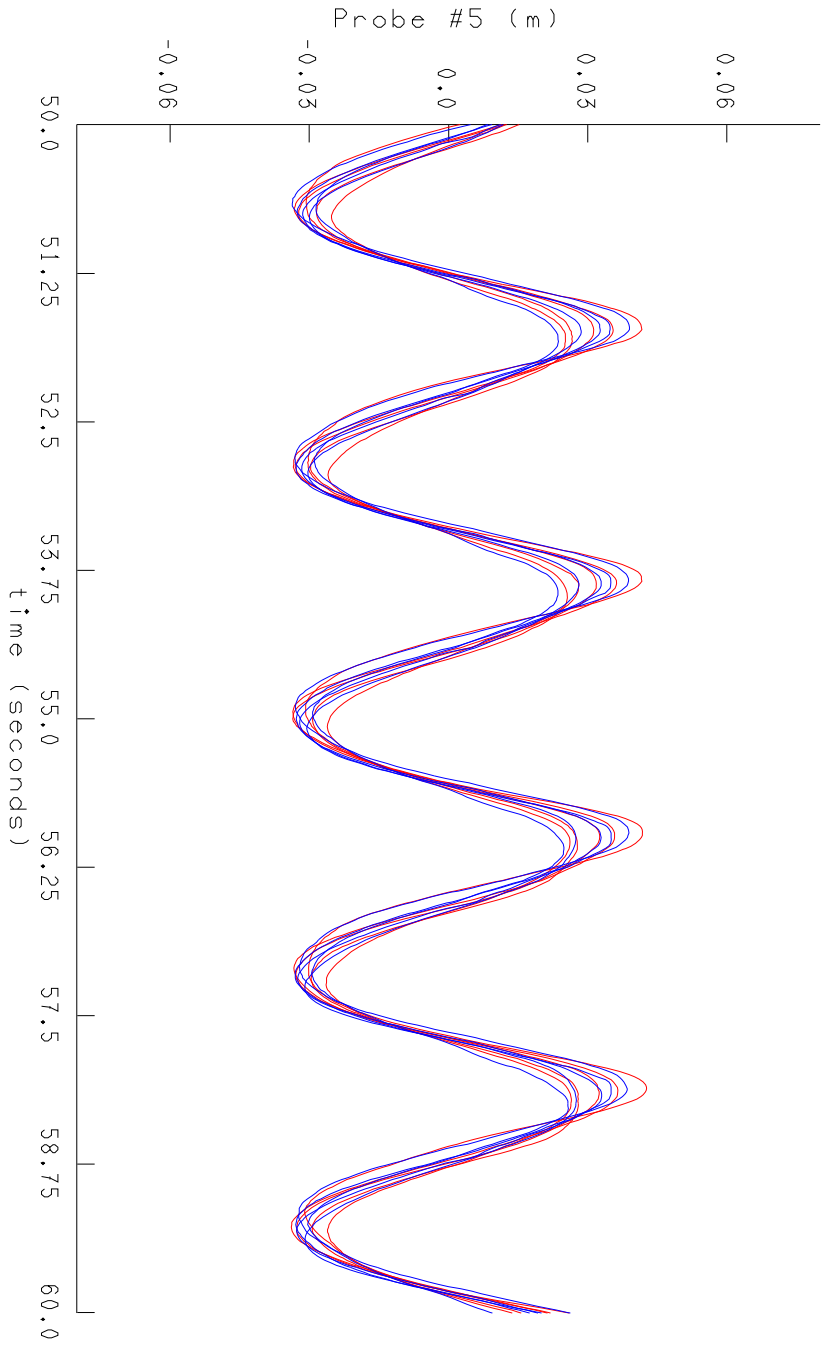

Fig. 2a: Surface elevations at Probes: 5-4-3-6-7
M4-1 : REGP4_H0P08_T2P145

before after

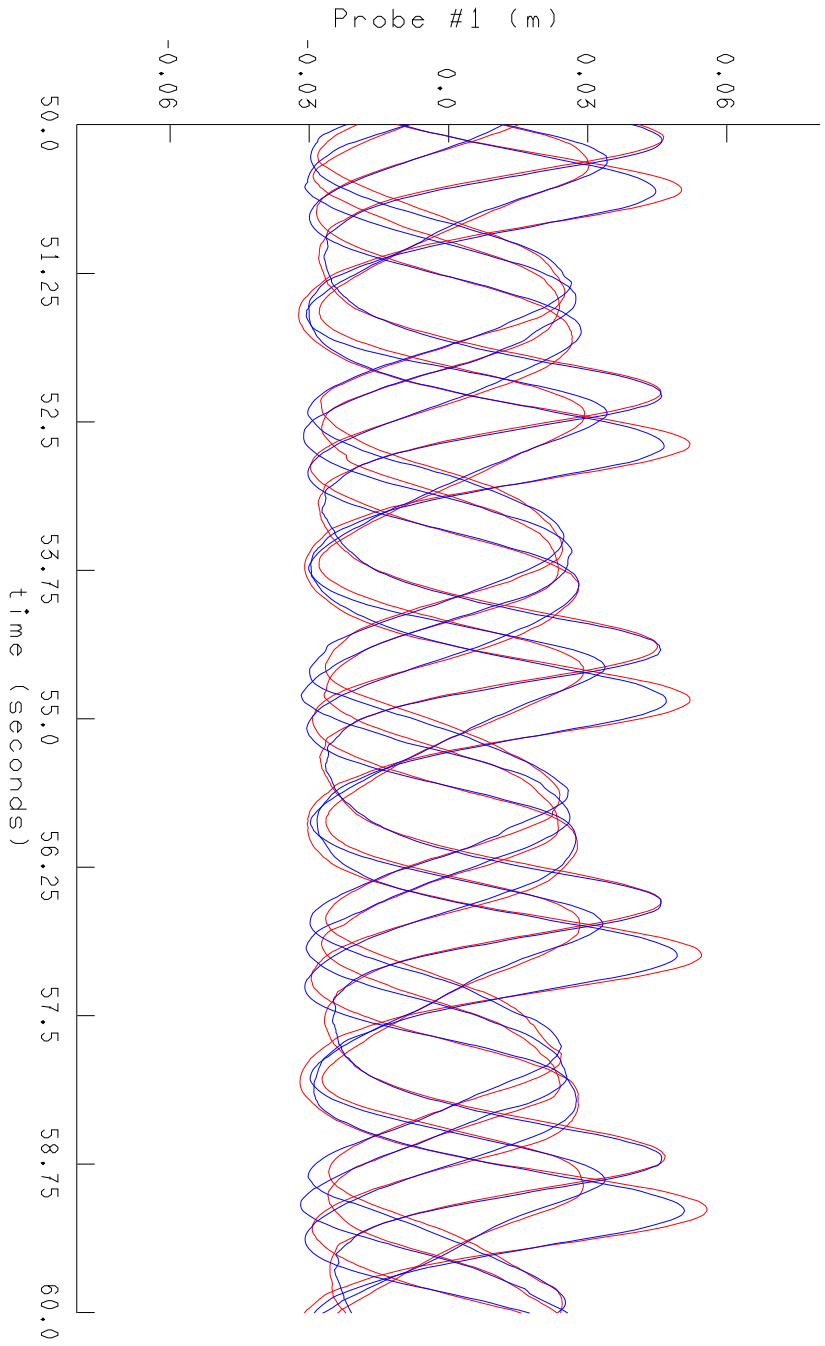

Fig. 2b: Surface elevations at Probes: 1-2-3-8-9-10
M4-1 : REGP4_H0P08_T2P145

before after

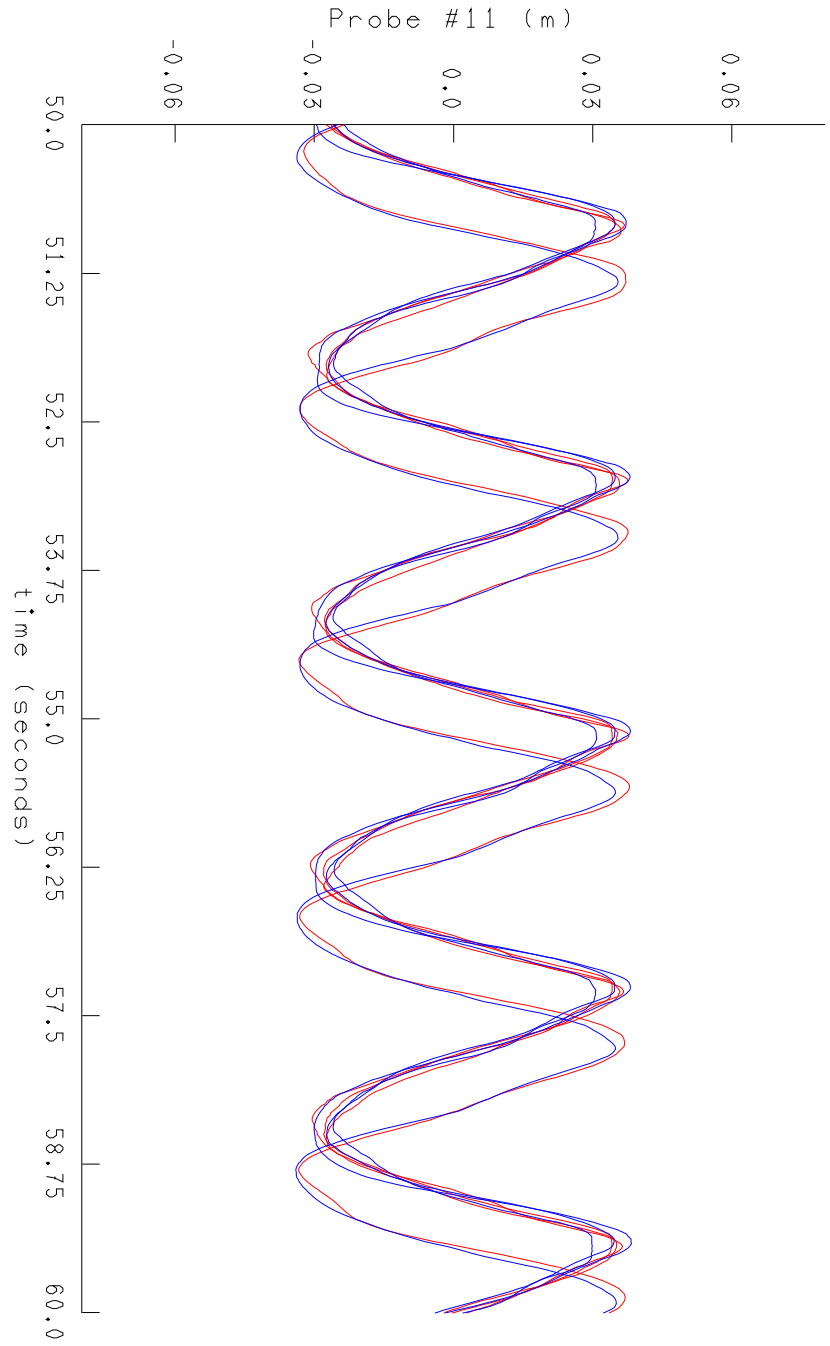

Fig. 2c: Surface elevations at Probes: 11-12-13-14
M4-1 : REGP4_H0P08_T2P145

before after

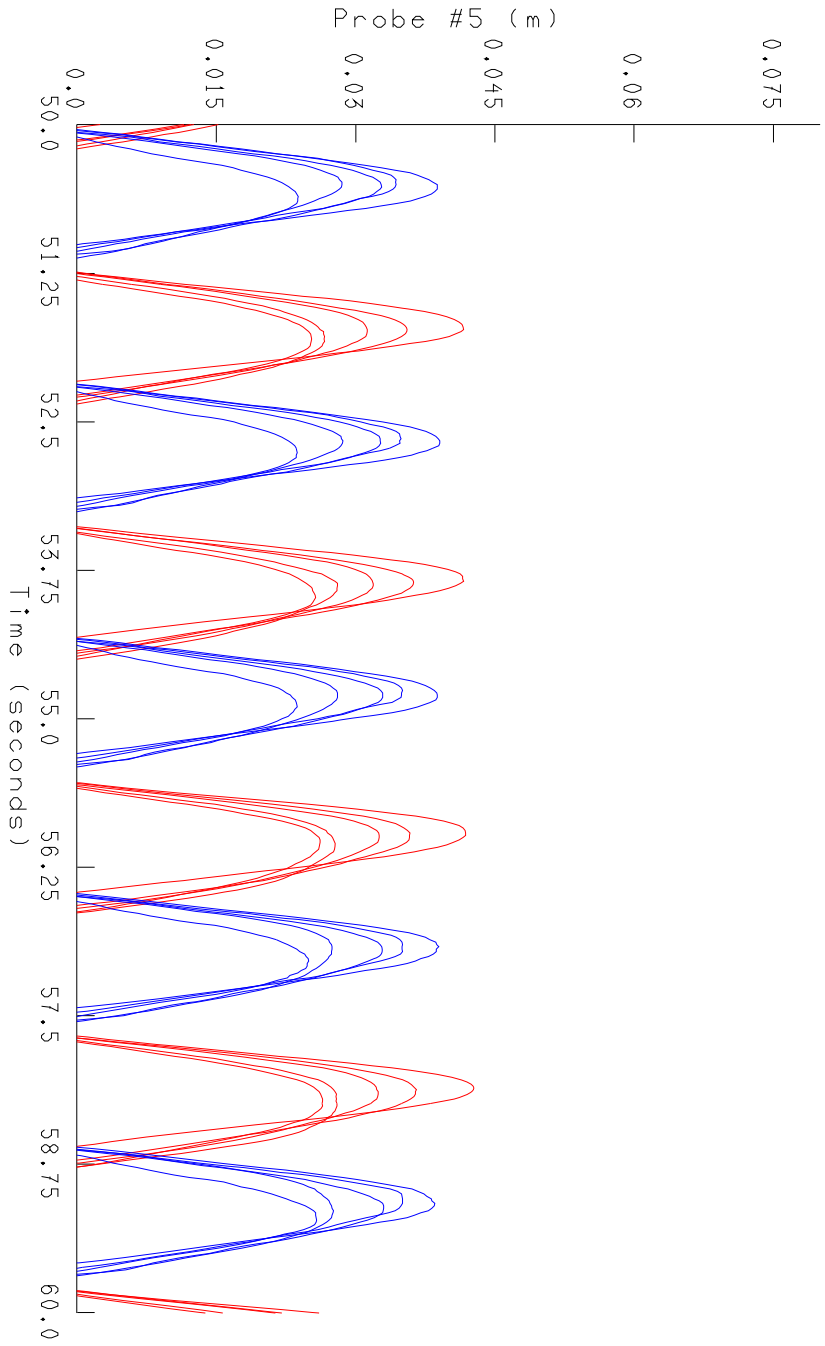

Fig. 2d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M4-1 : REGP4_H0P08_T2P145

before after

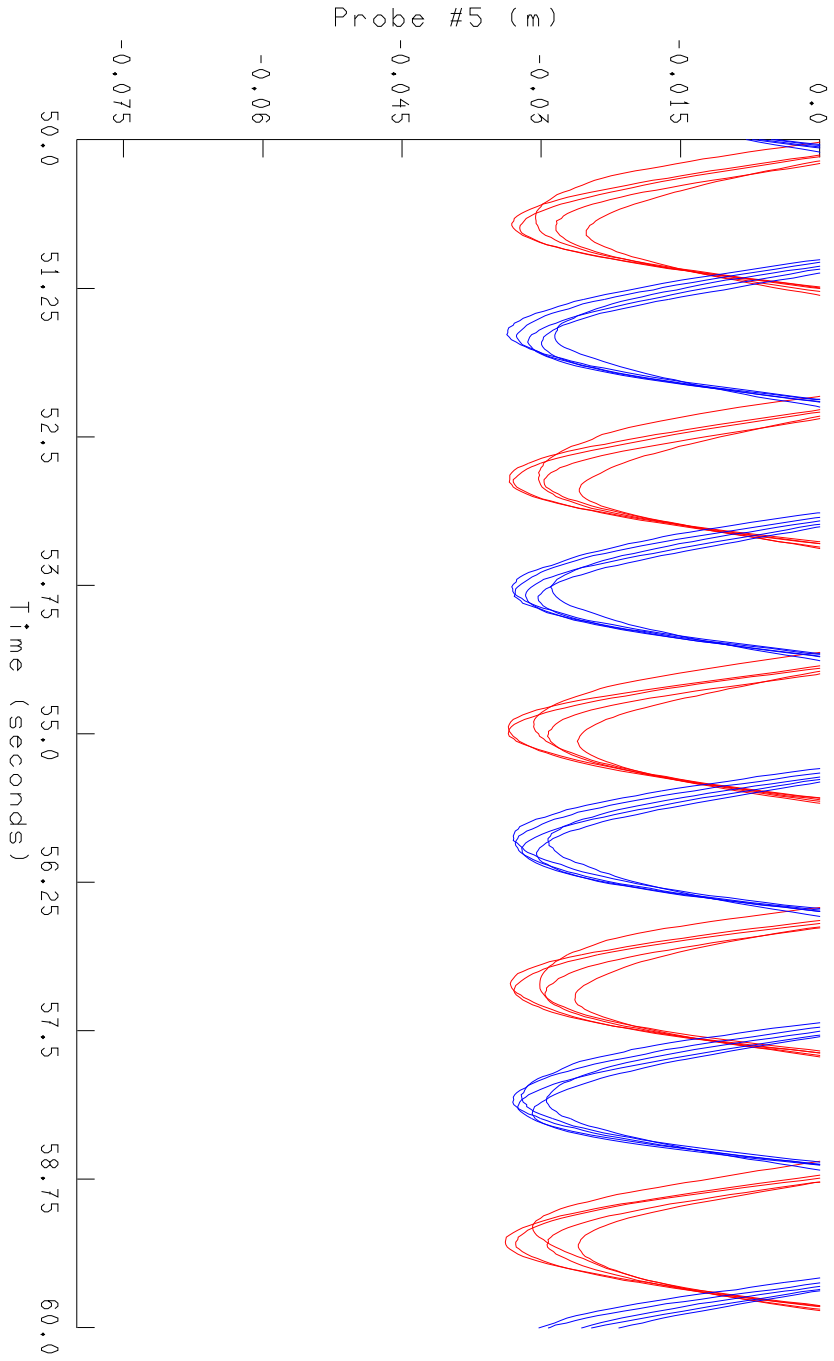

Fig. 2e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M4-1 : REGP4_H0P08_T2P145

before after

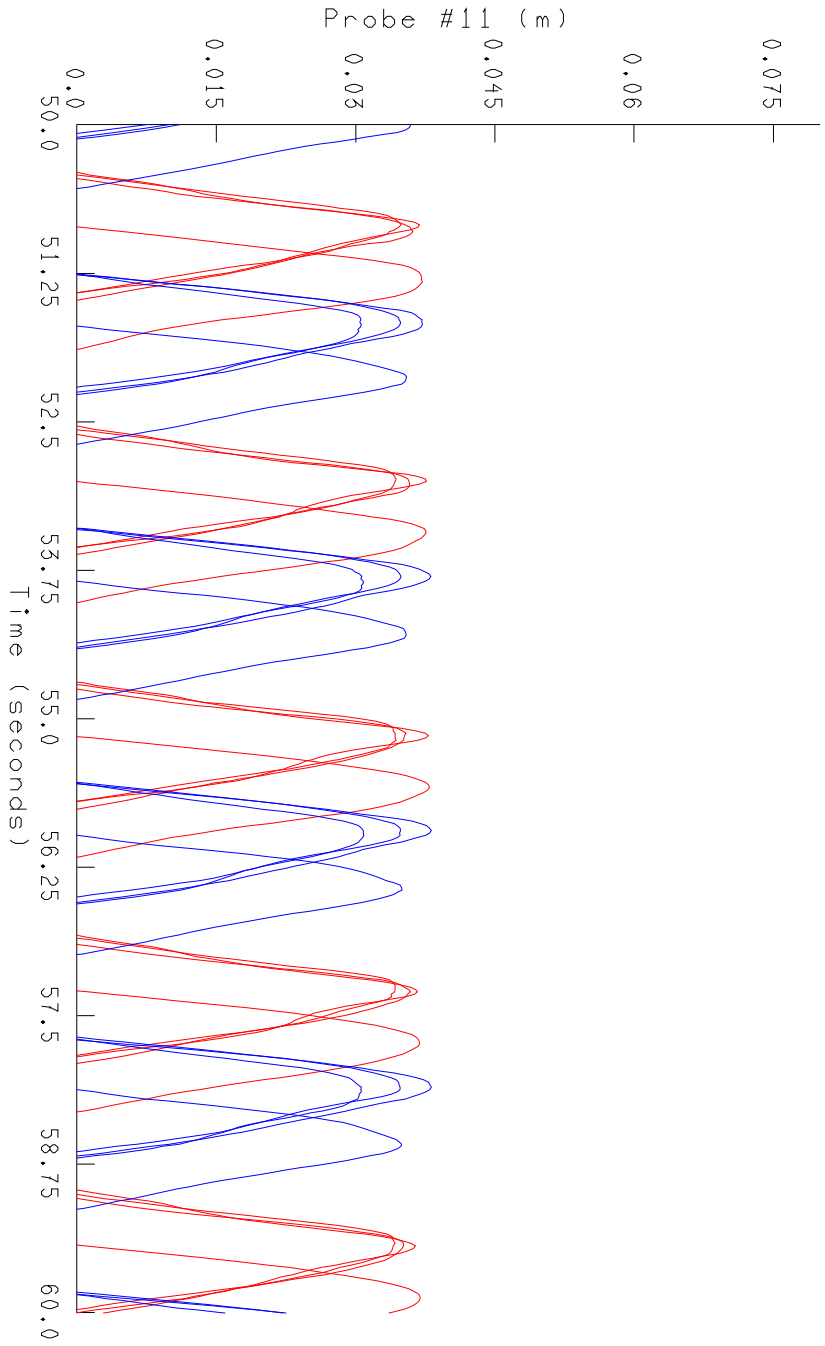

Fig. 2f: Surface elevations at Probes: 11-12-13-14 (Crest)
M4-1 : REGP4_H0P08_T2P145

before after

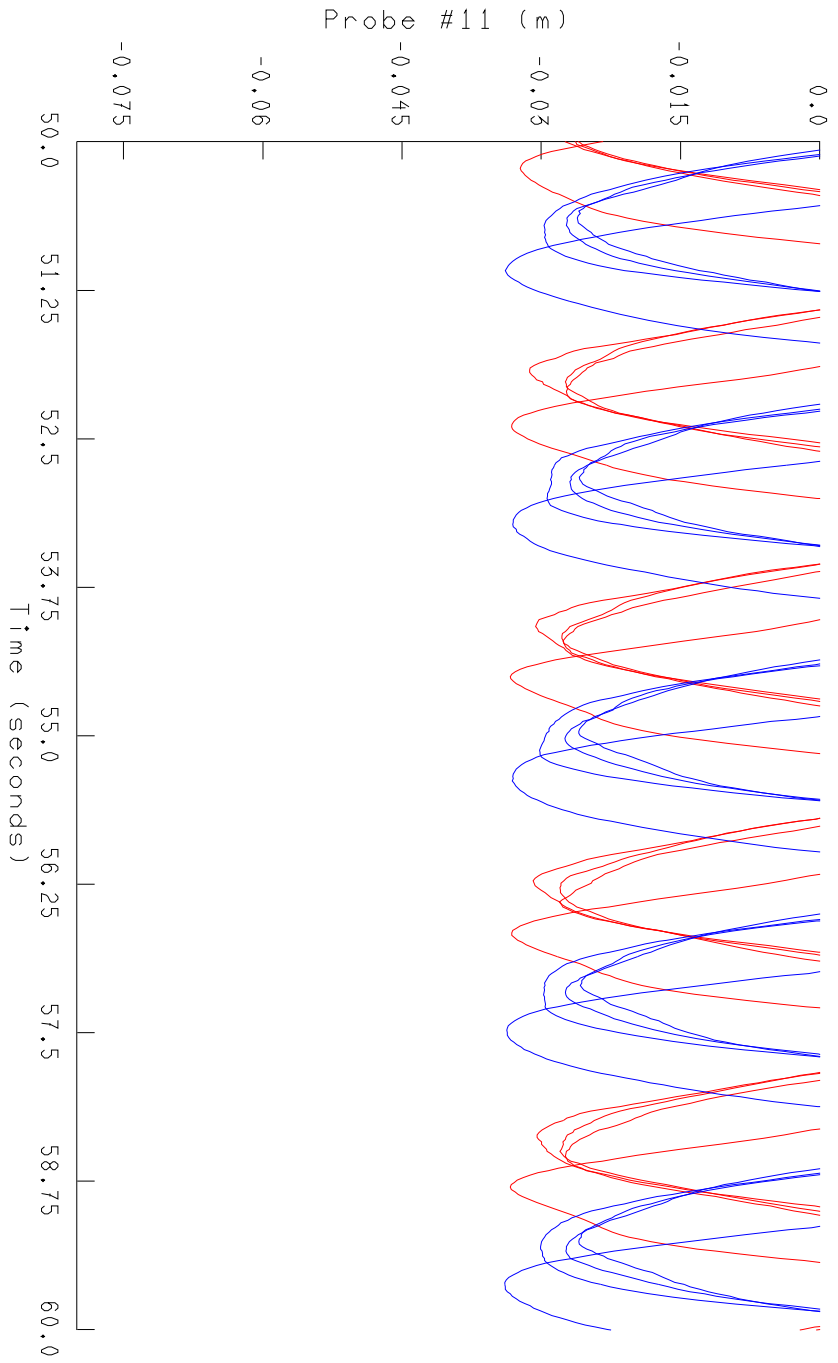

Fig. 2g: Surface elevations at Probes: 11-12-13-14 (Trough)
M4-1 : REGP4_H0P08_T2P145

before after

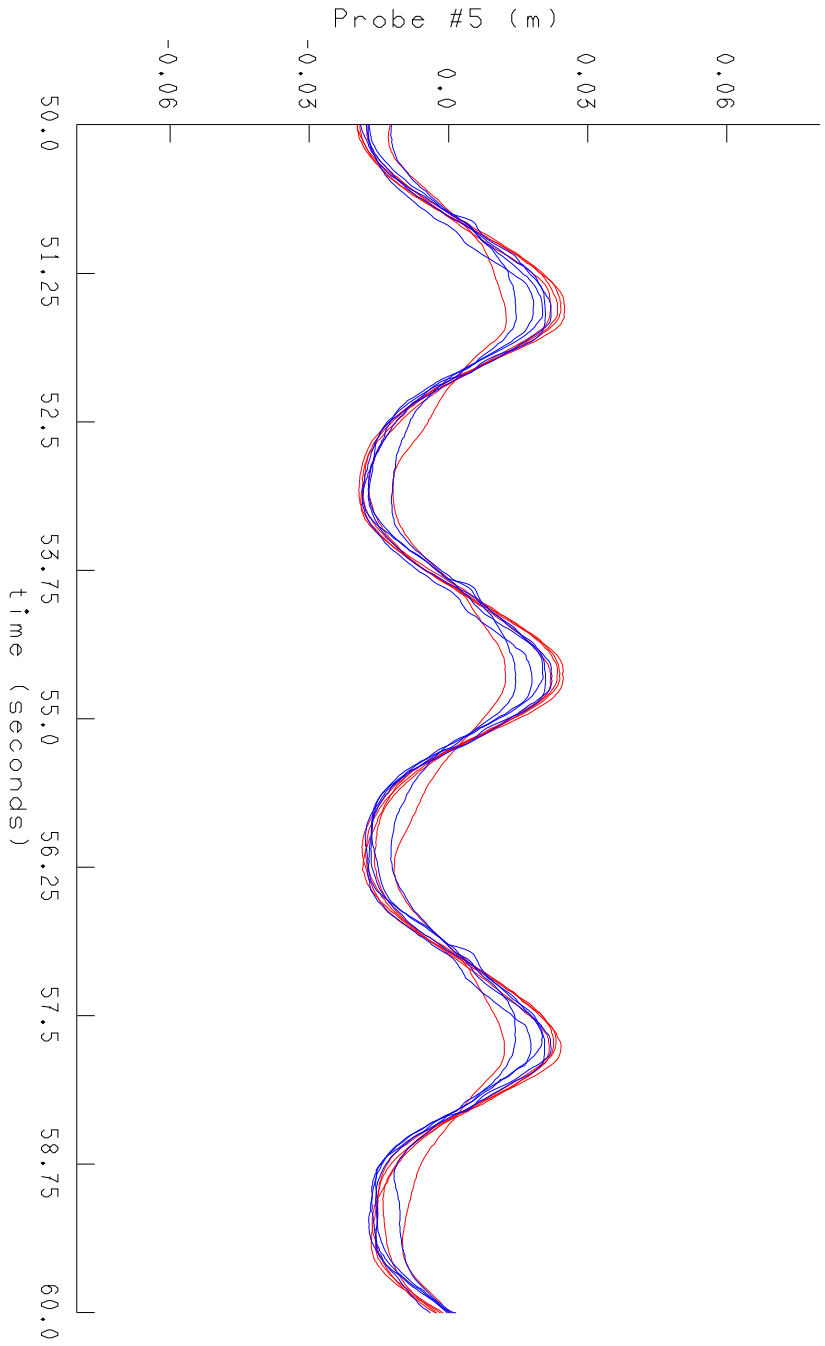

Fig. 3a: Surface elevations at Probes: 5-4-3-6-7
M4-2 : REGP4_H0P06_T3P116

before after

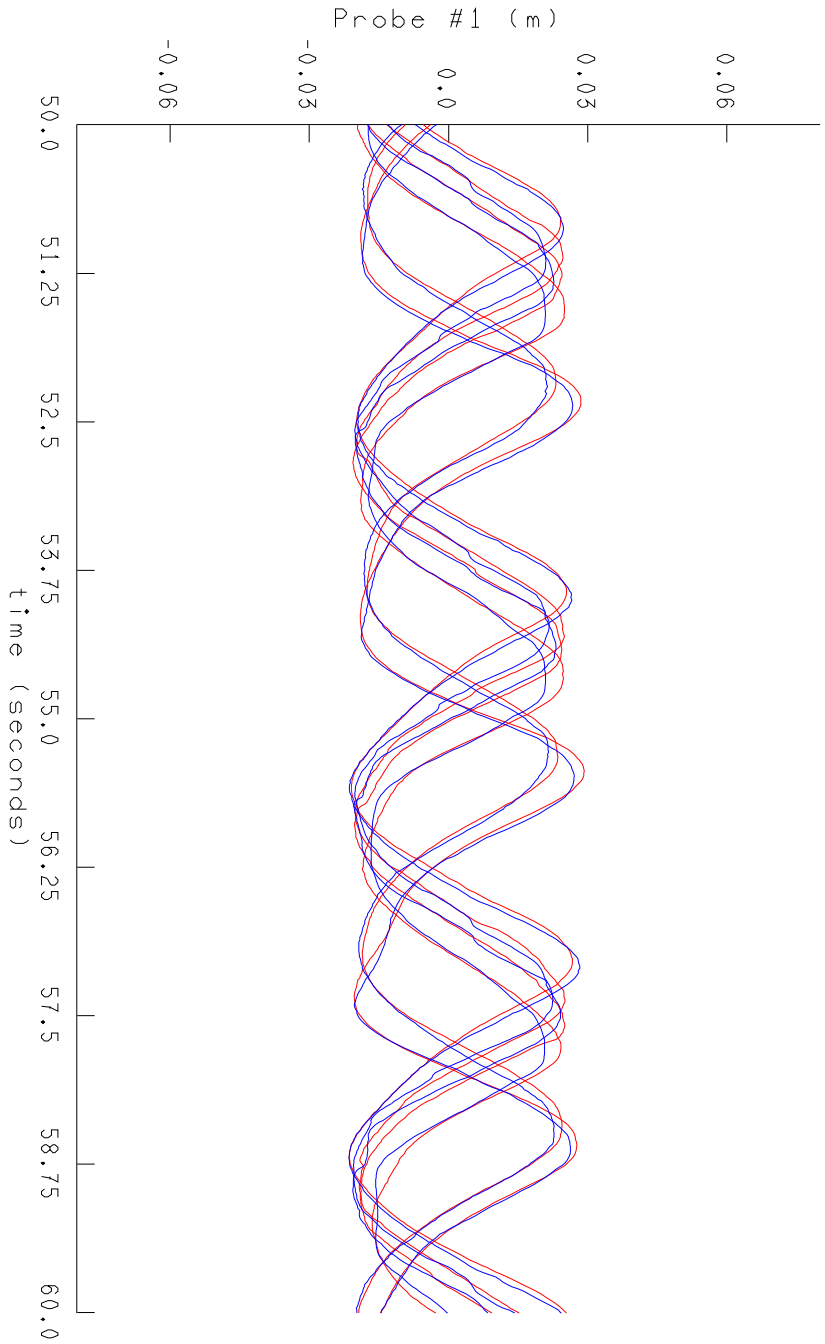

Fig. 3b: Surface elevations at Probes: 1-2-3-8-9-10
M4-2 : REGP4_H0P06_T3P116

before after

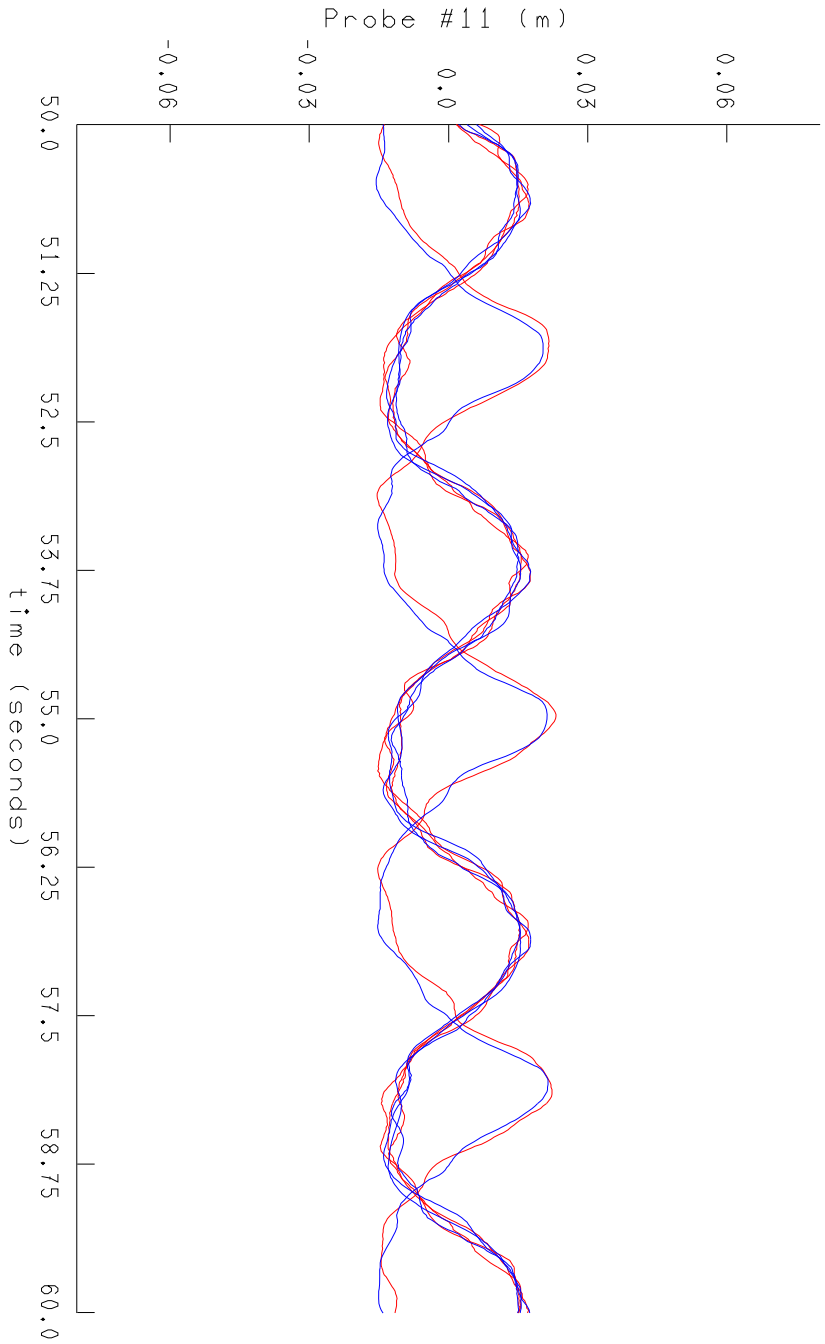

Fig. 3c: Surface elevations at Probes: 11-12-13-14
M4-2 : REGP4_H0P06_T3P116

before after

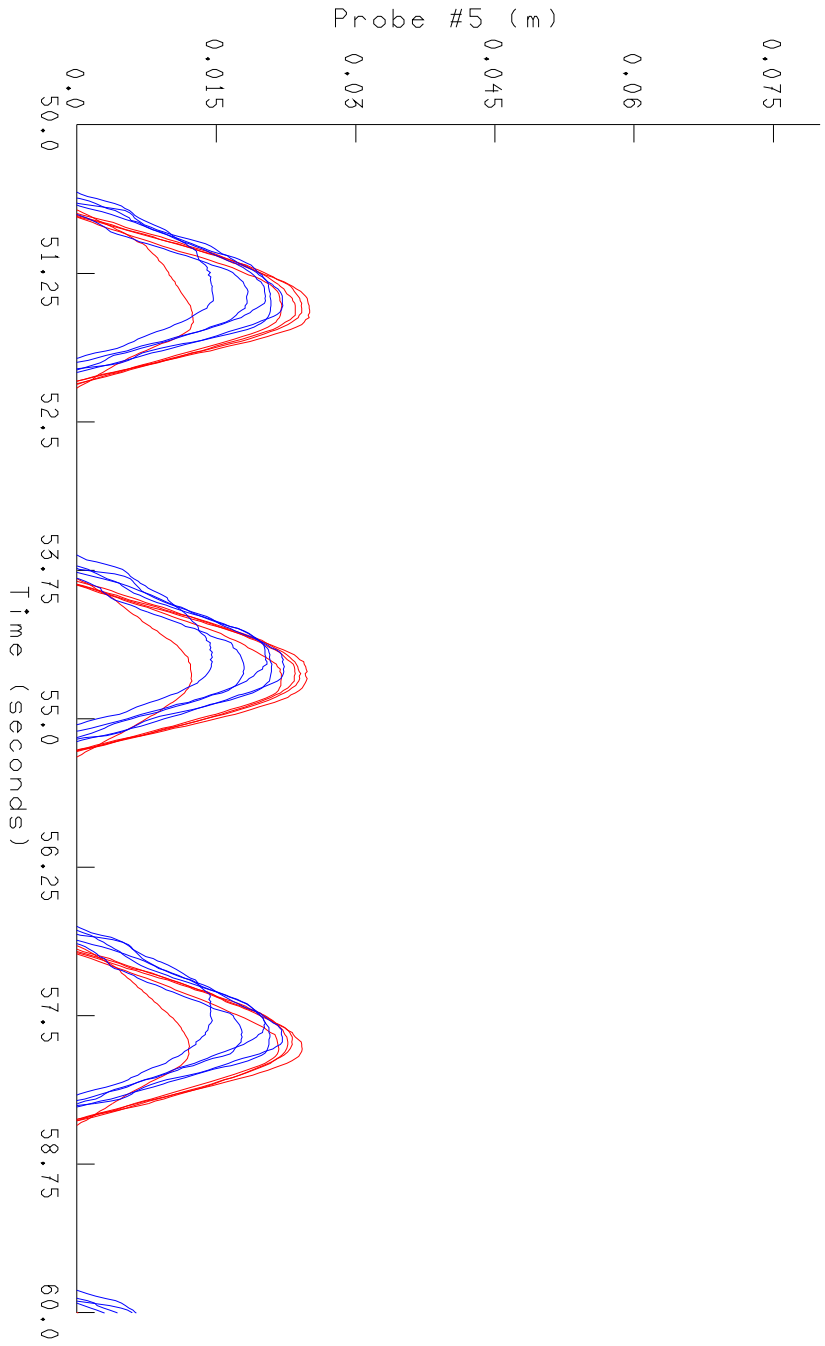

Fig. 3d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M4-2 : REGP4_H0P06_T3P116

before after

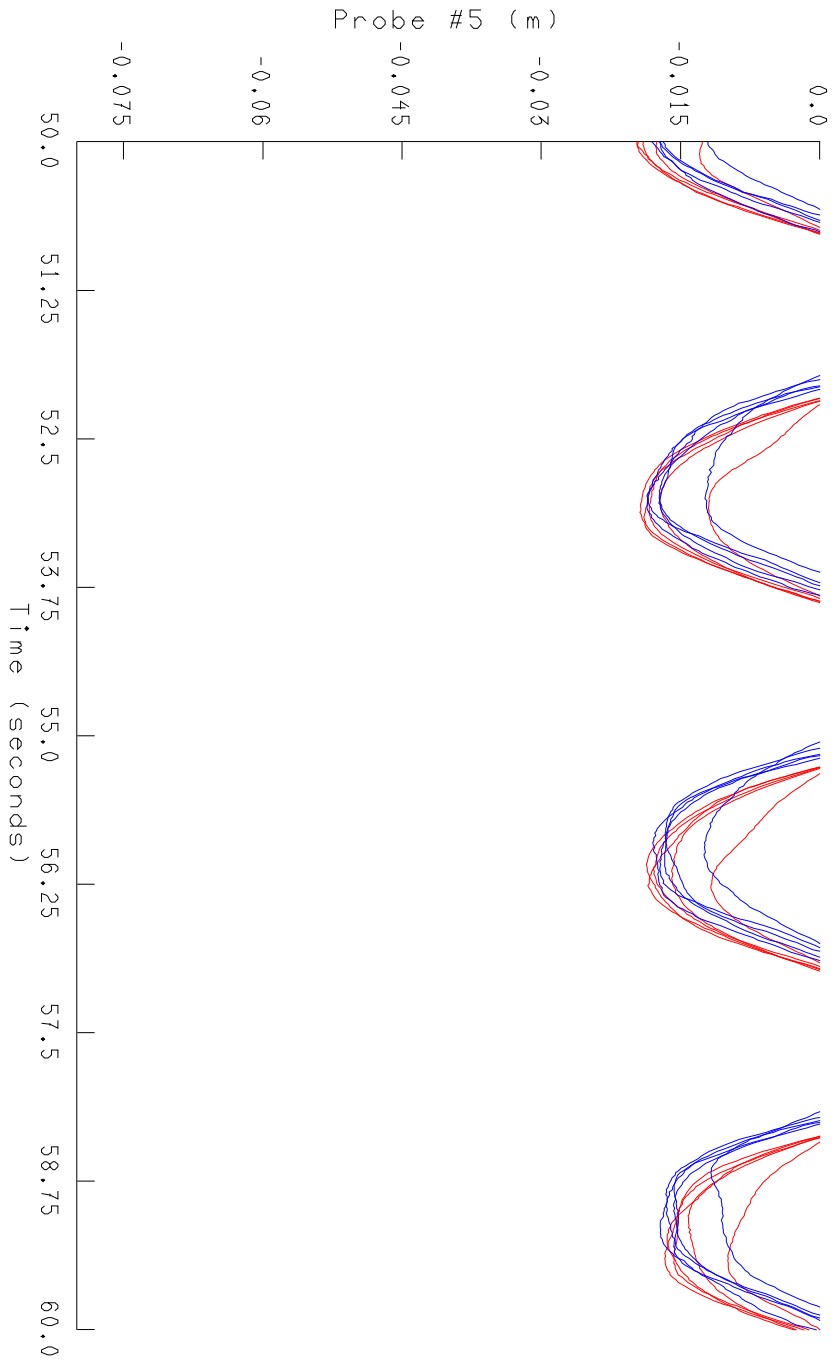

Fig. 3e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M4-2 : REGP4_H0P06_T3P116

before after

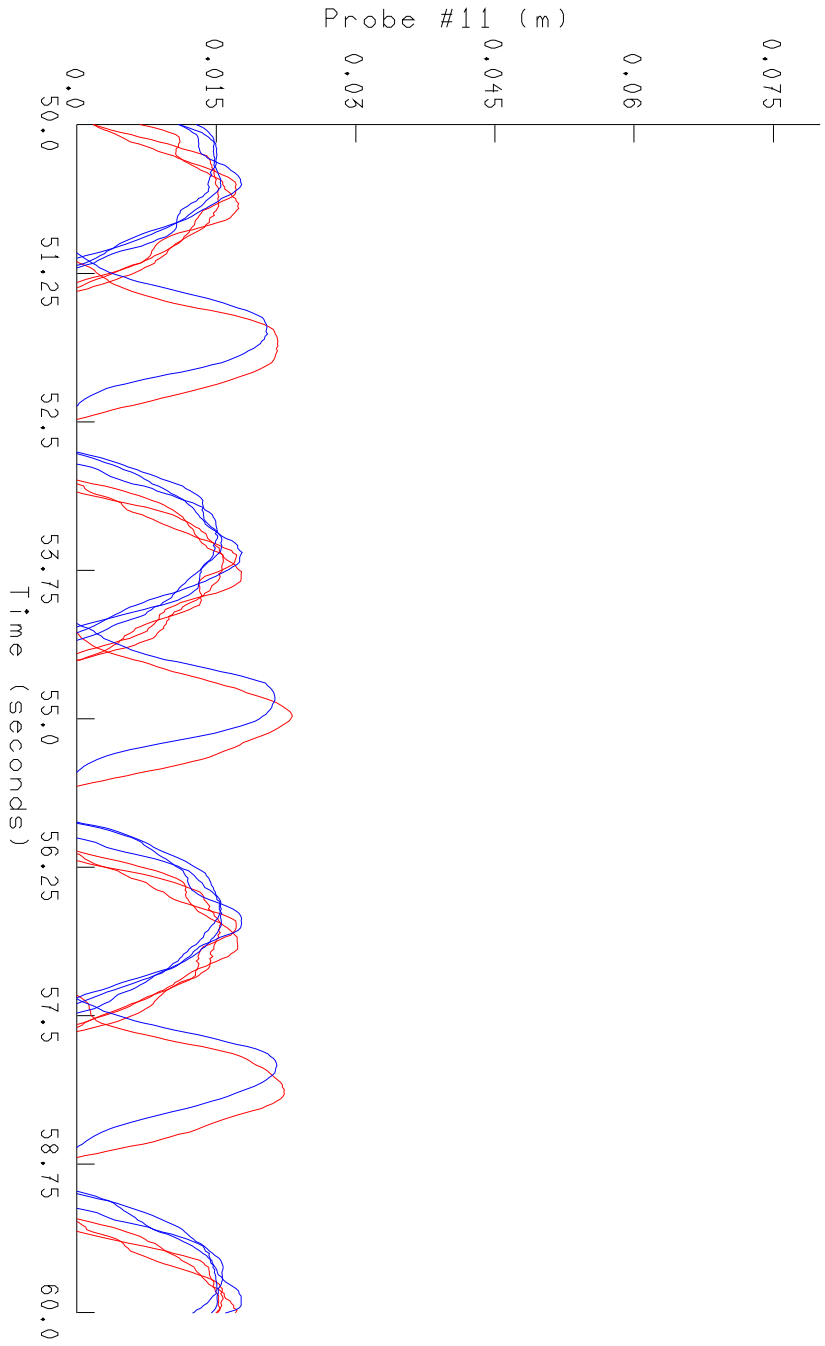

Fig. 3f: Surface elevations at Probes: 11-12-13-14 (Crest)
M4-2 : REGP4_H0P06_T3P116

before after

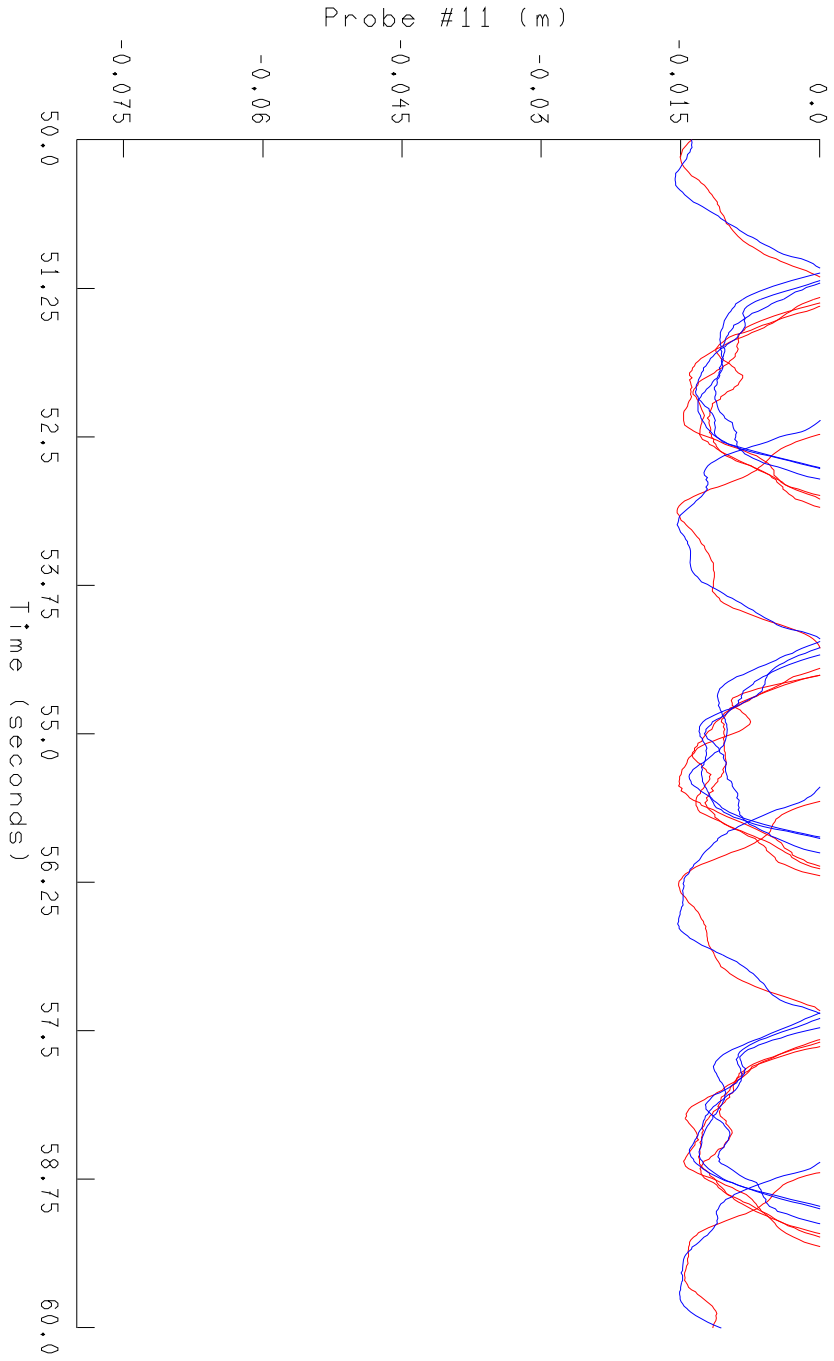

Fig. 3g: Surface elevations at Probes: 11-12-13-14 (Trough)
M4-2 : REGP4_H0P06_T3P116

before after

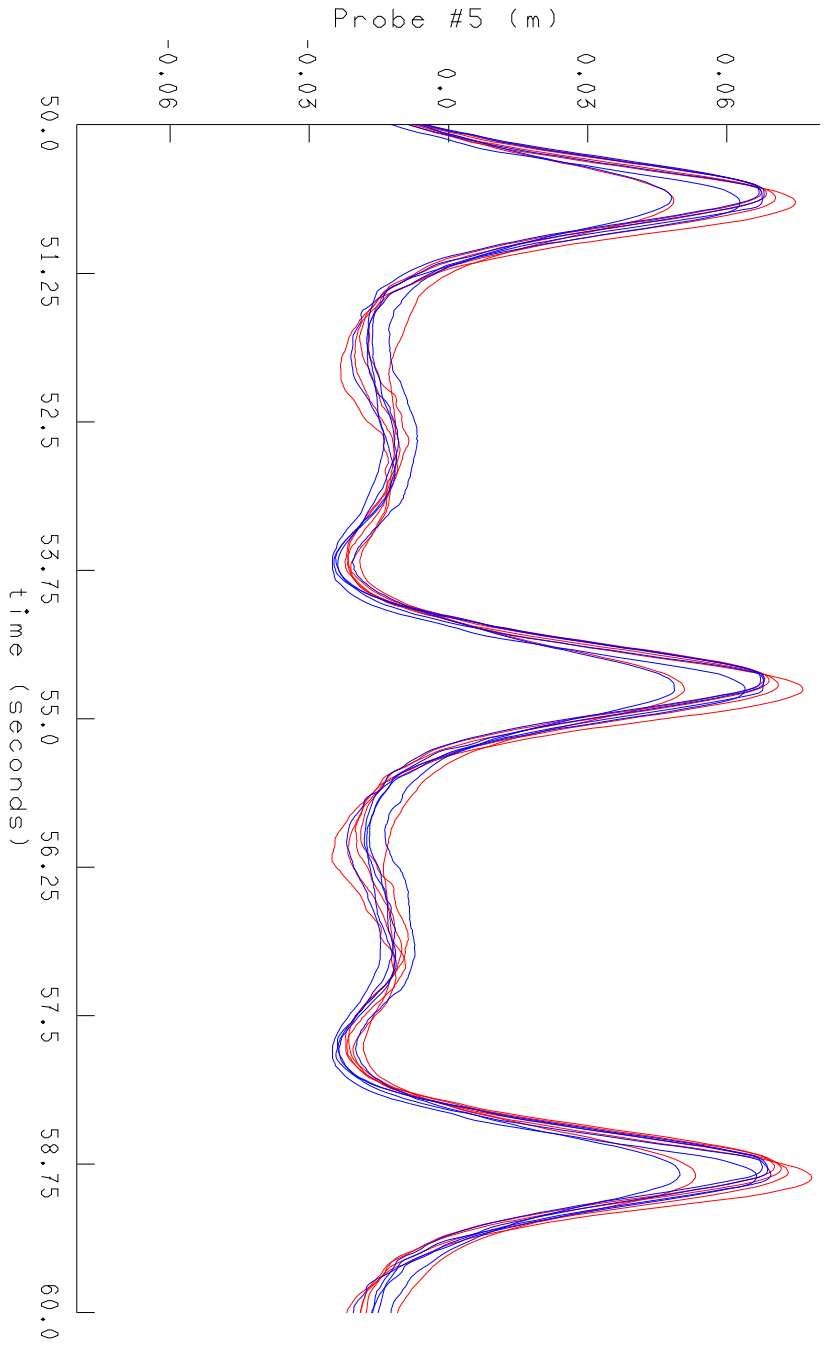

Fig. 4a: Surface elevations at Probes: 5-4-3-6-7
M4-3 : REGP4_H0P08_T4P105

before after

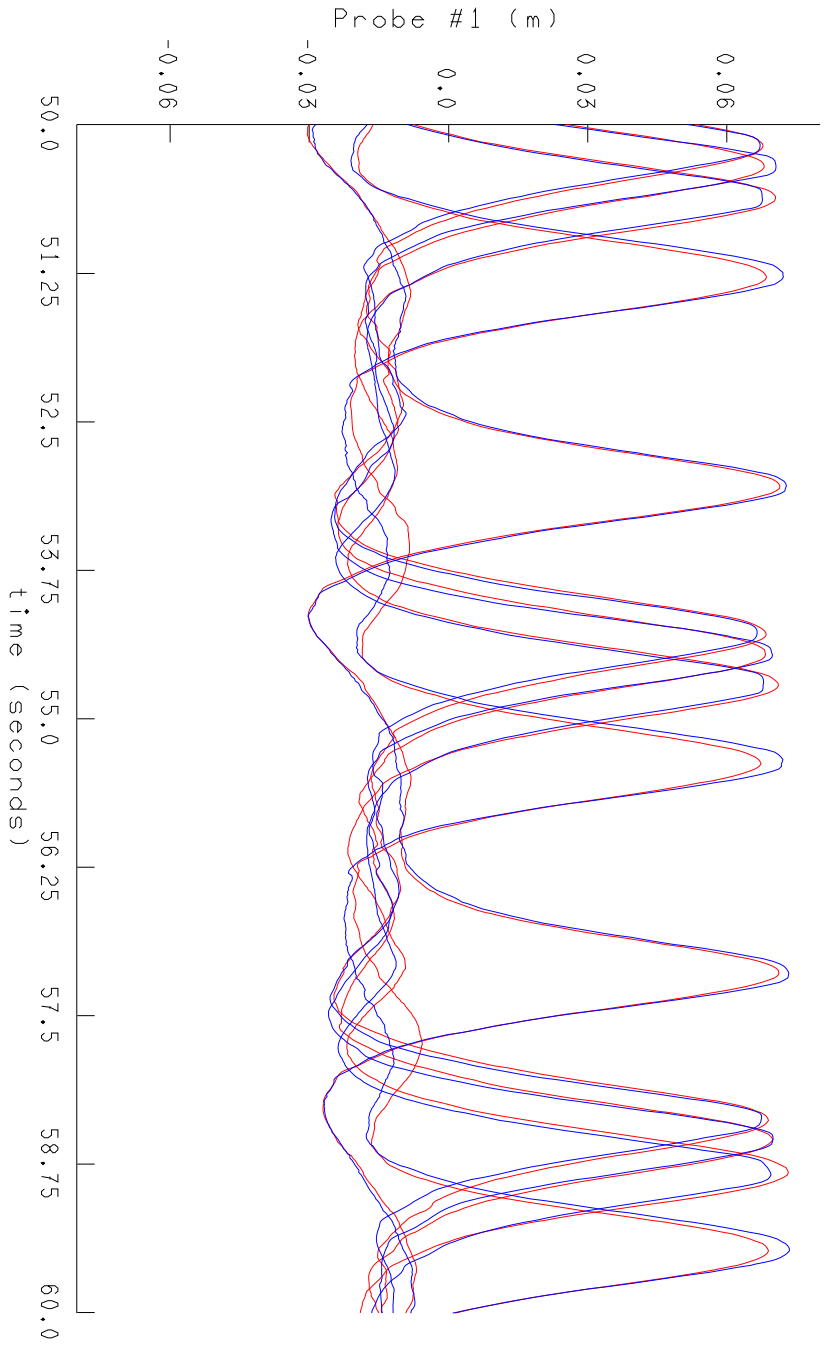

Fig. 4b: Surface elevations at Probes: 1-2-3-8-9-10
M4-3 : REGP4_H0P08_T4P105

before after

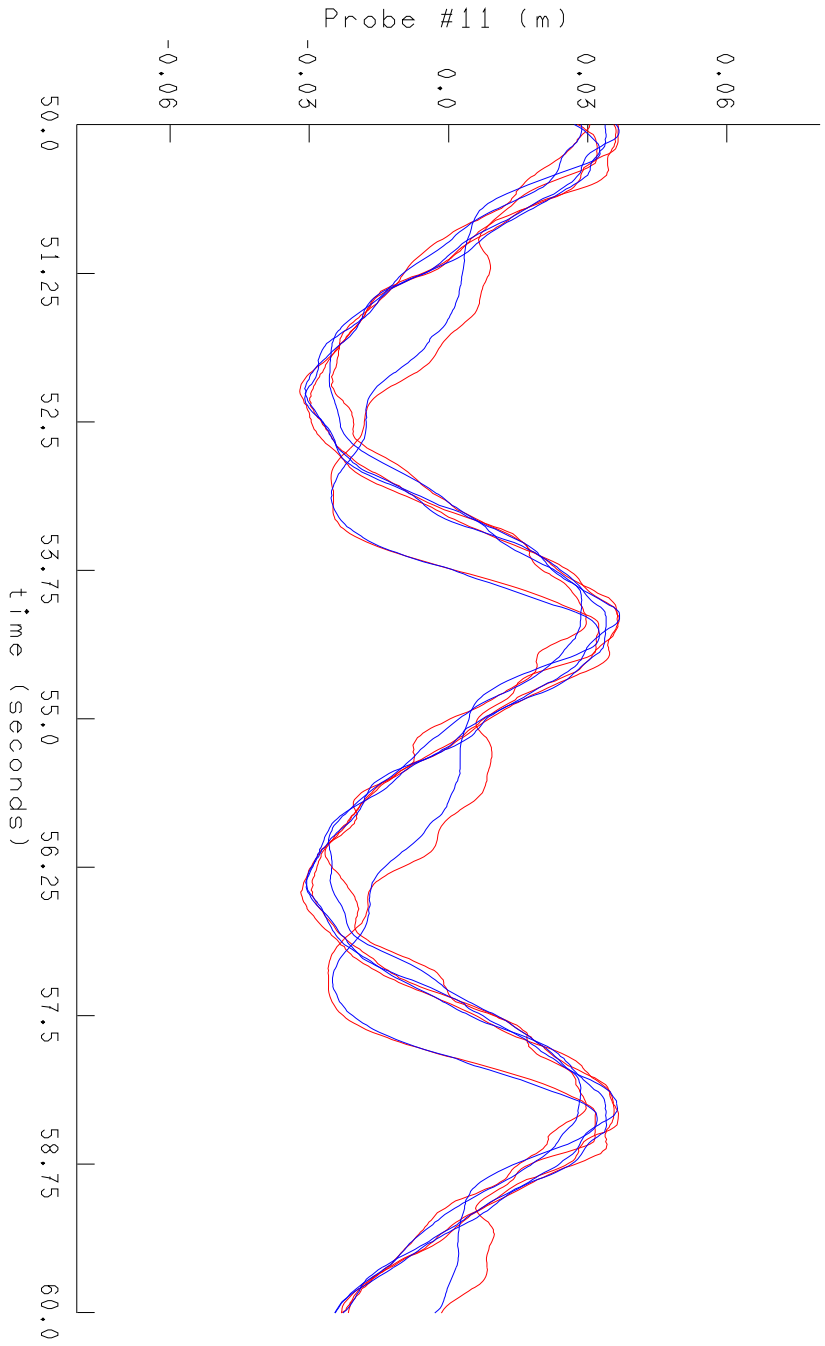

Fig. 4c: Surface elevations at Probes: 11-12-13-14
M4-3 : REGP4_H0P08_T4P105

before after

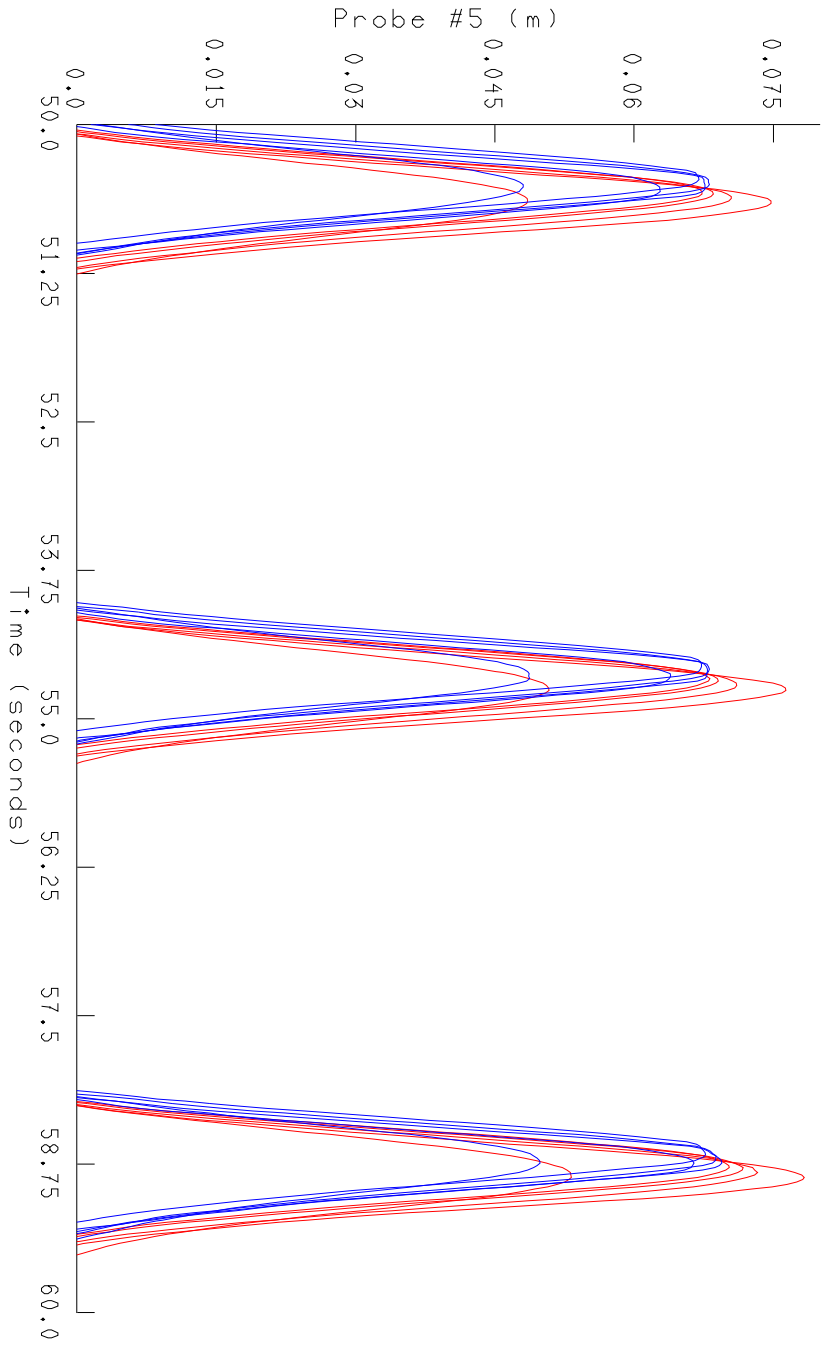

Fig. 4d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M4-3 : REGP4_H0P08_T4P105

before after

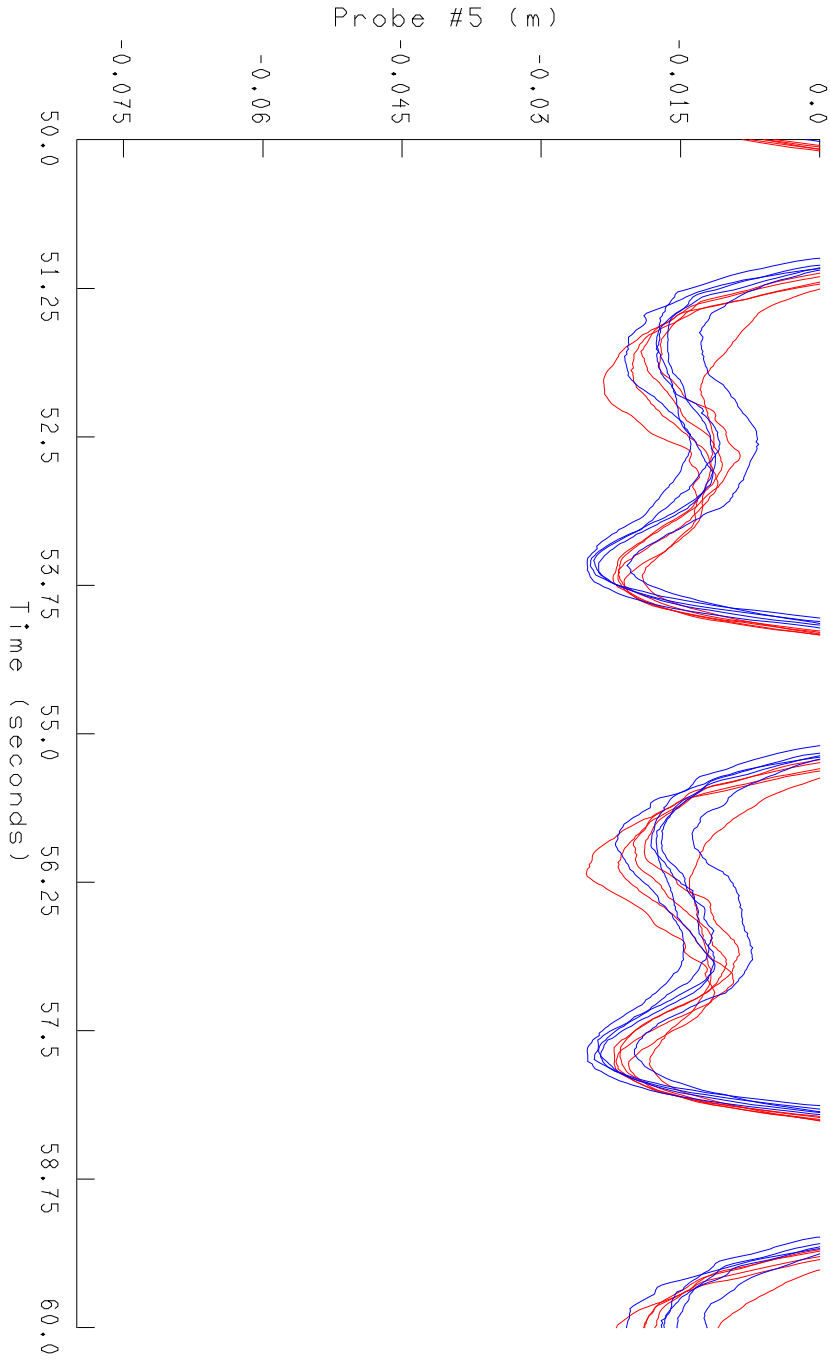

Fig. 4e: Surface elevations at Probes: 5, 4, 3, 6, 7 (Trough)
M4-3 : REGP4_H0P08_T4P105

before after

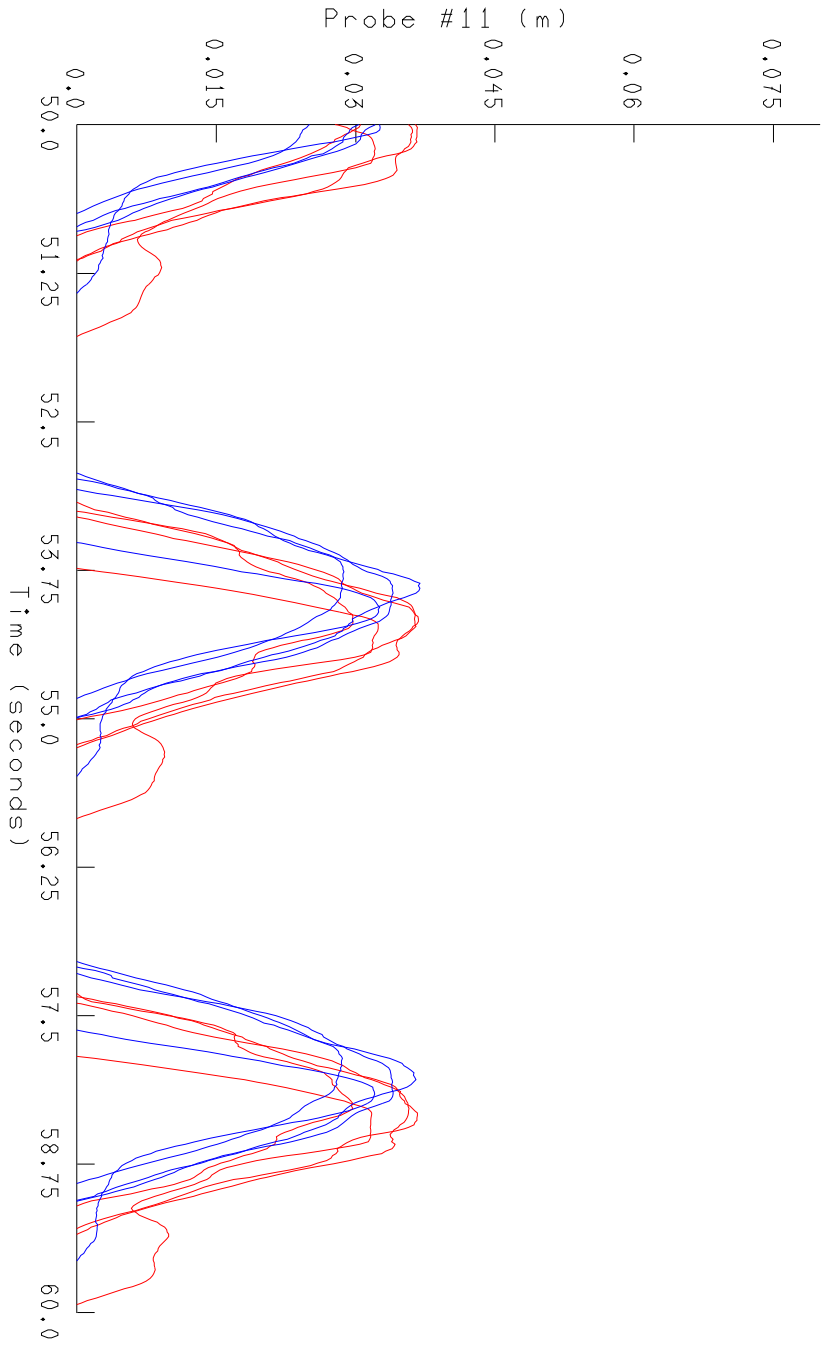

Fig. 4f: Surface elevations at Probes: 11-12-13-14 (Crest)
M4-3 : REGP4_H0P06_T3P116

before after

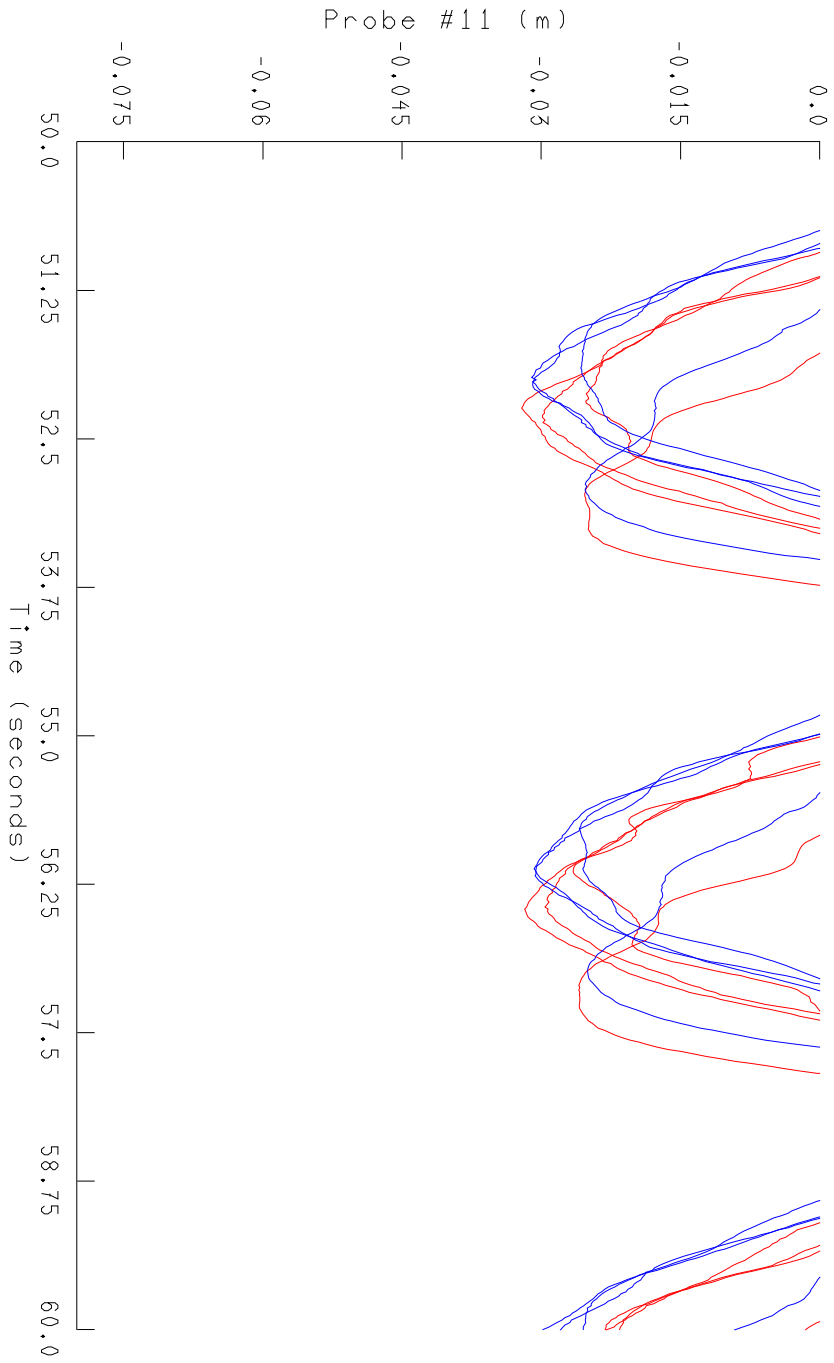

Fig. 4g: Surface elevations at Probes: 11-12-13-14 (trough)
M4-3 : REGP4_H0P08_T4P105

before after

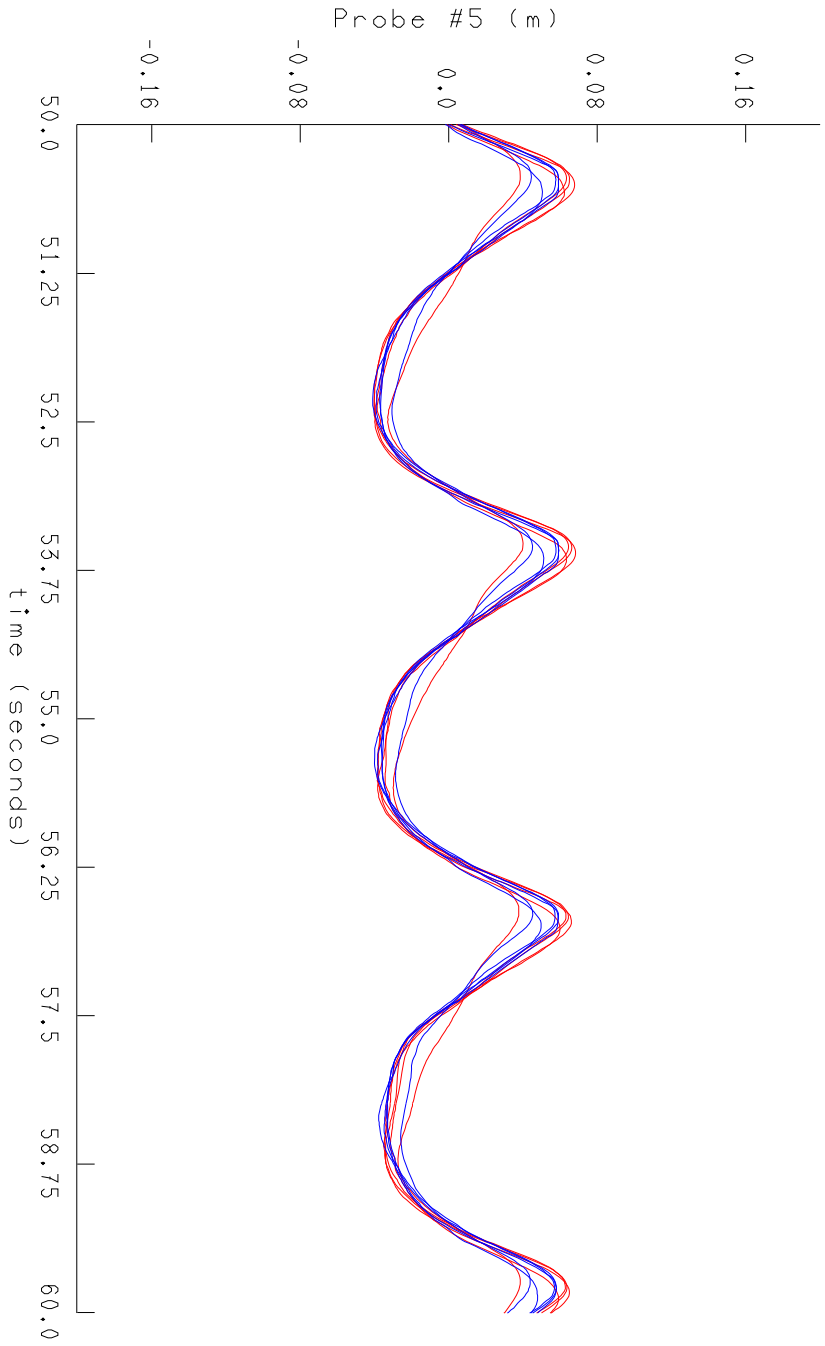

Fig. 5a: Surface elevations at Probes: 5-4-3-6-7
M4-4 : REGP4_H0P12_T3P116

before after

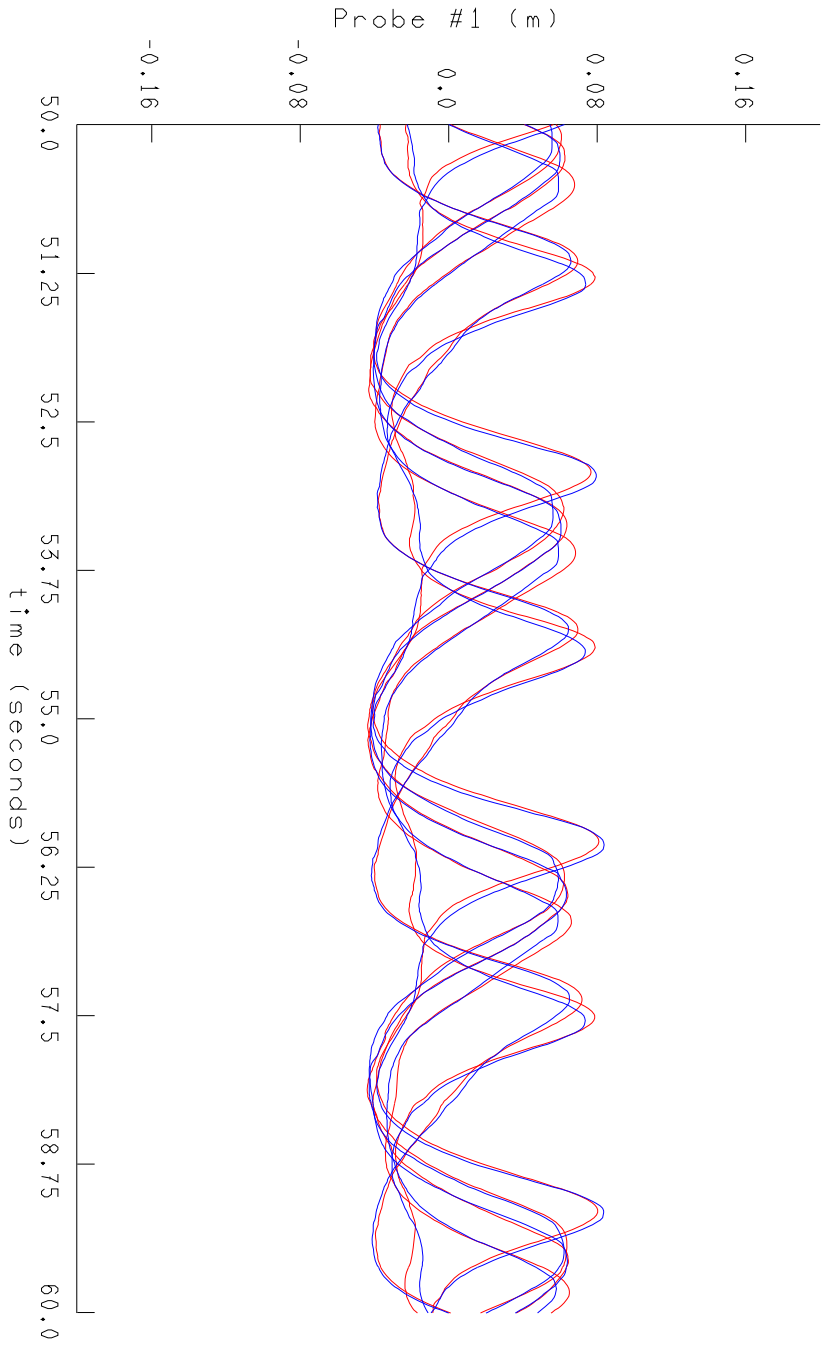

Fig. 5b: Surface elevations at Probes: 1-2-3-8-9-10
M4-4 : REGP4_H0P12_T3P116

before after

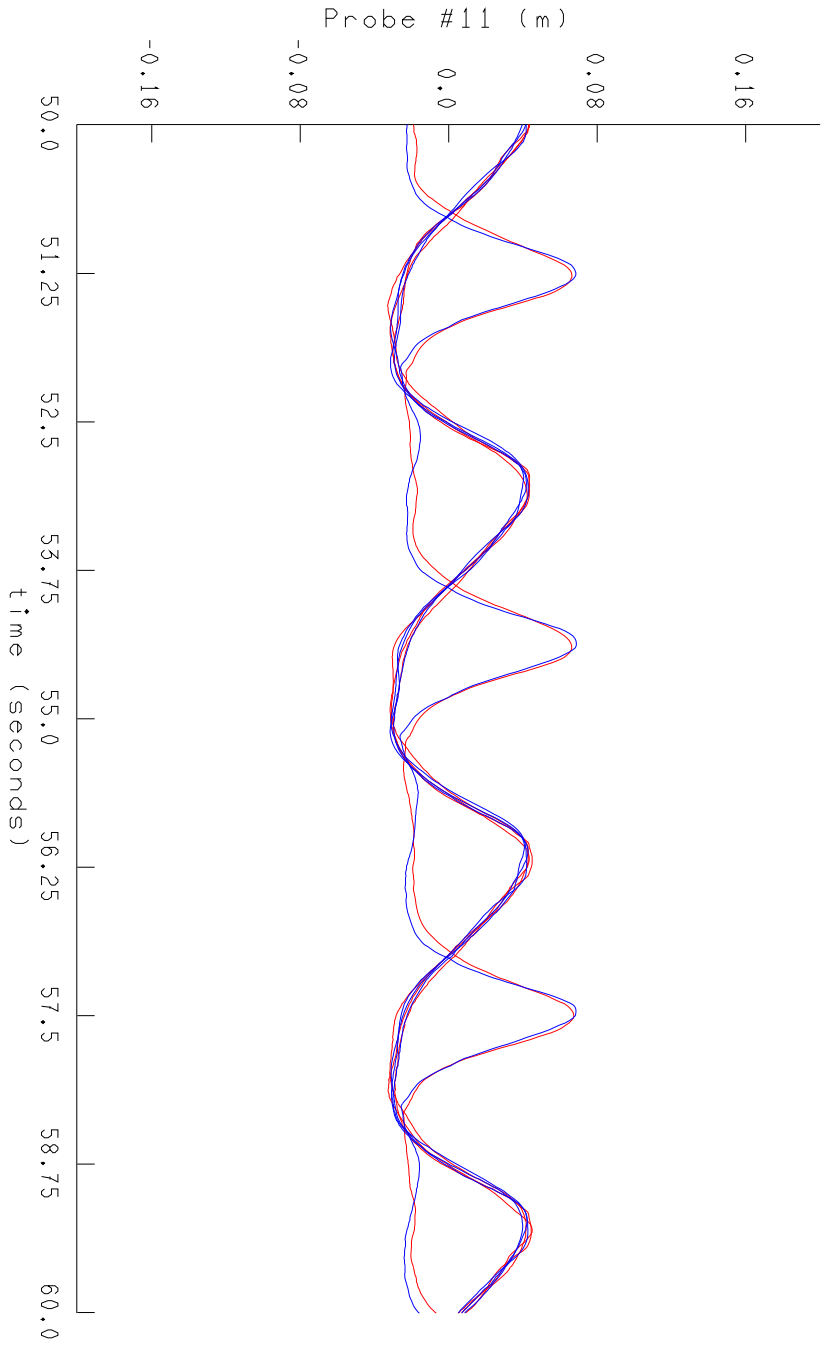

Fig. 5c: Surface elevations at Probes: 11-12-13-14
M4-4 : REGP4_H0P12_T3P116

before after

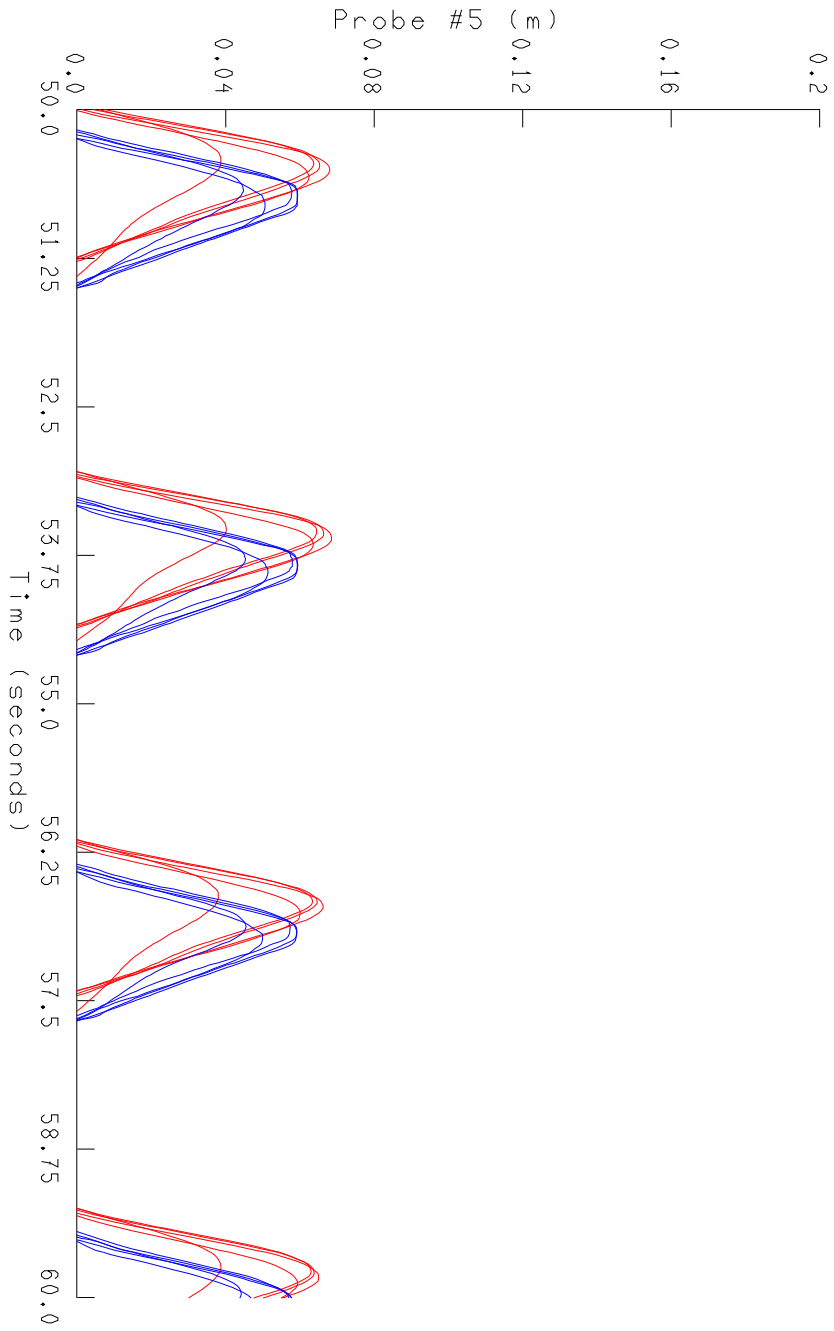

Fig. 5d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M4-4 : REGP4_H0P12_T3P116

before after

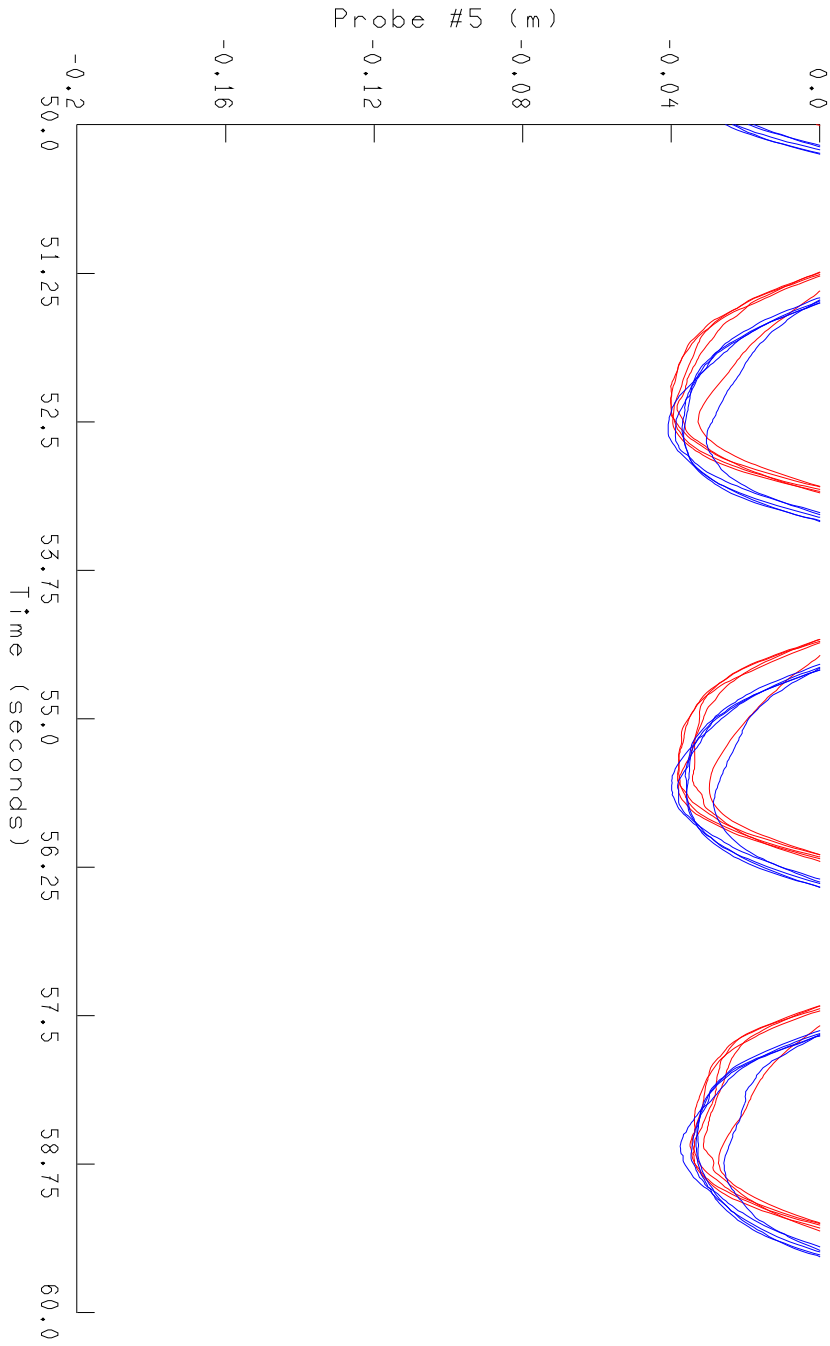

Fig. 5e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M4-4 : REGP4_H0P12_T3P116

before after

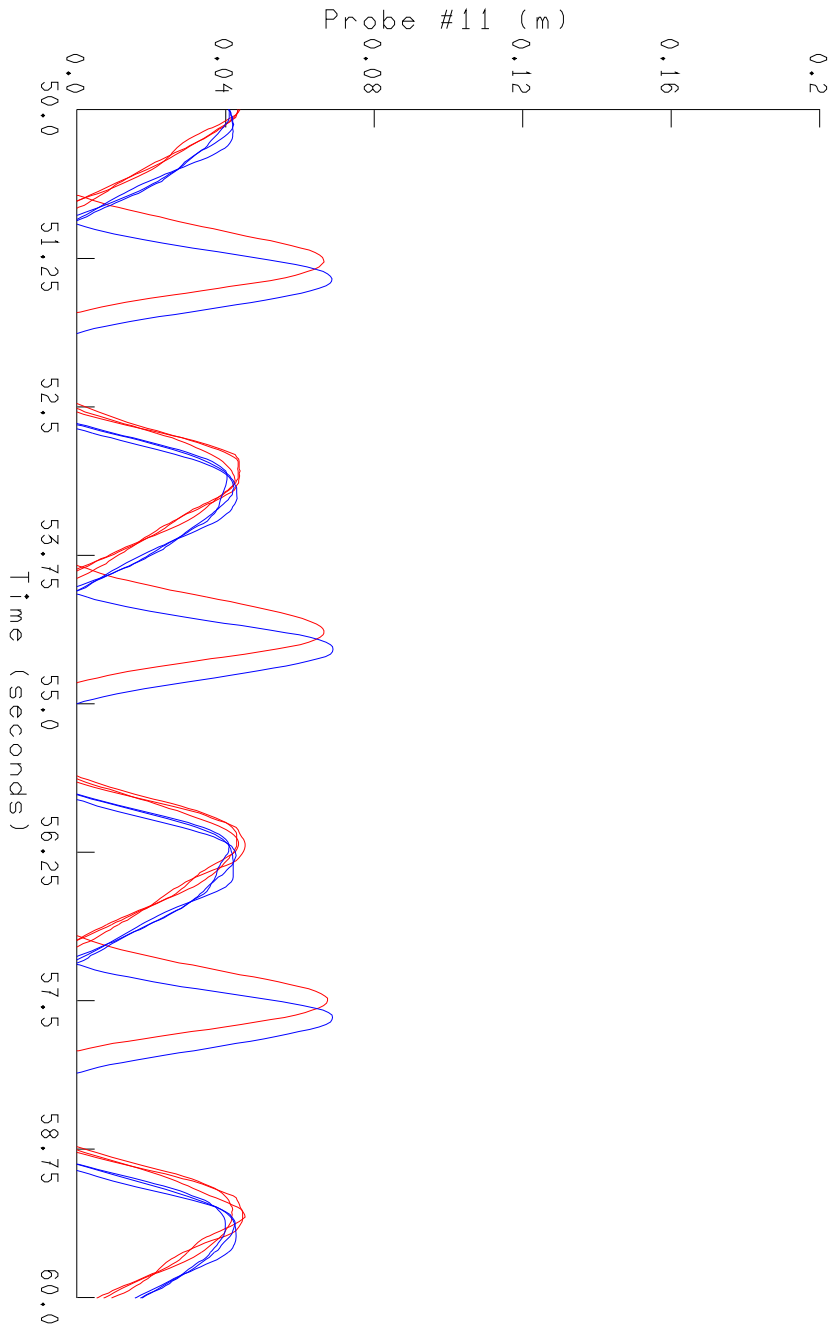

Fig. 5f: Surface elevations at Probes: 11-12-13-14 (Crest)
M4-4 : REGP4_H0P12_T3P116

before after

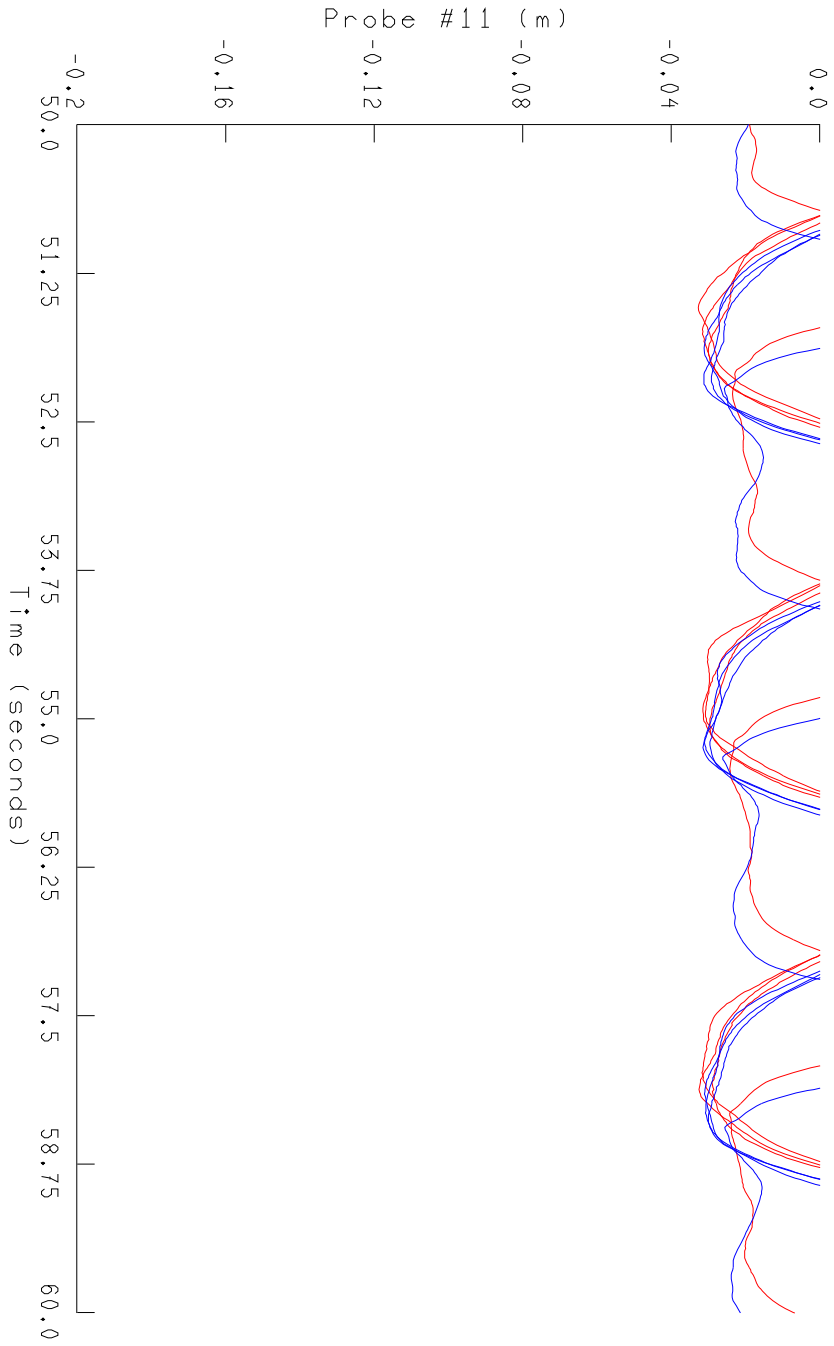

Fig. 5g: Surface elevations at Probes: 11-12-13-14 (Trough)
M4-4 : REGP4_H0P12_T3P116

before after

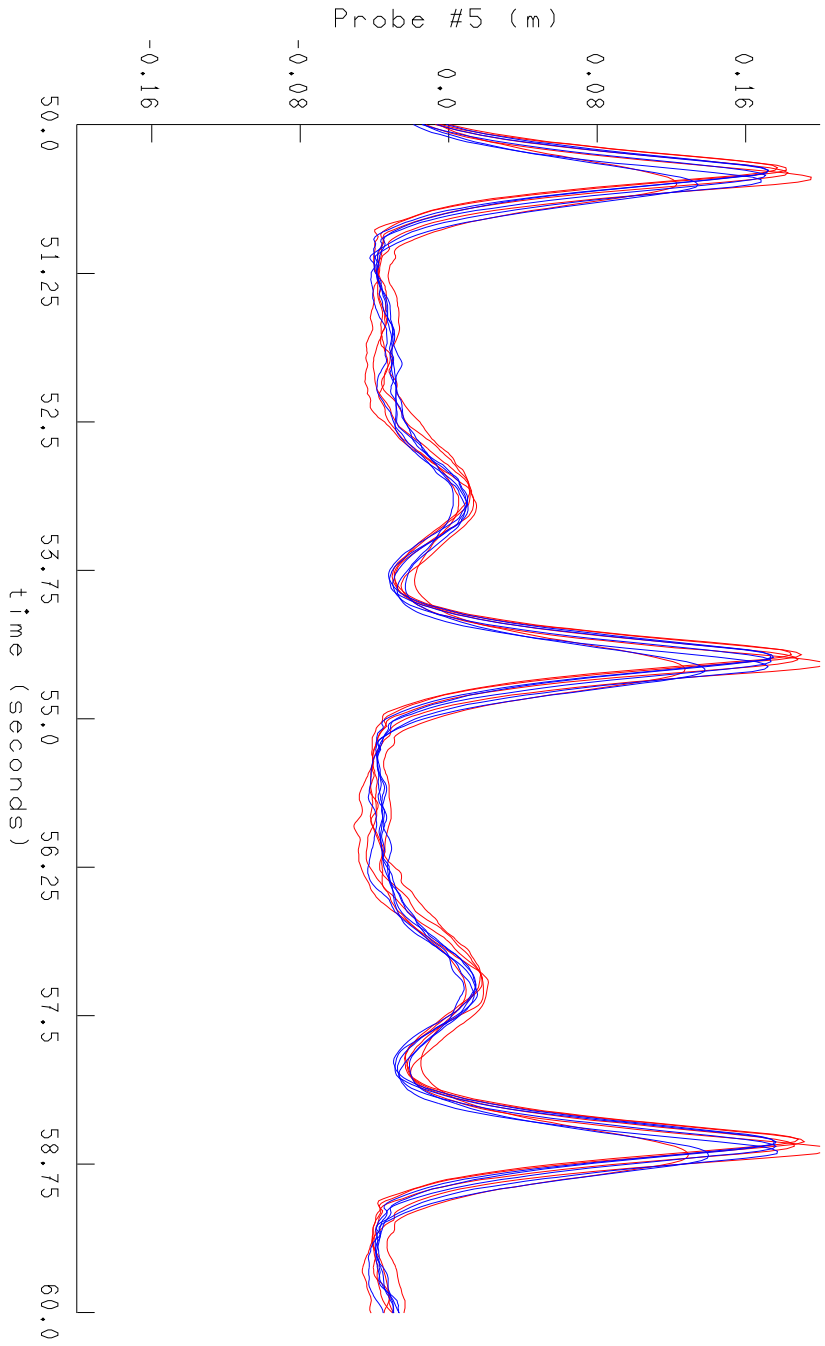

Fig. 6a: Surface elevations at Probes: 5-4-3-6-7
M4-5 : REGP4_H0P16_T4P105

before after

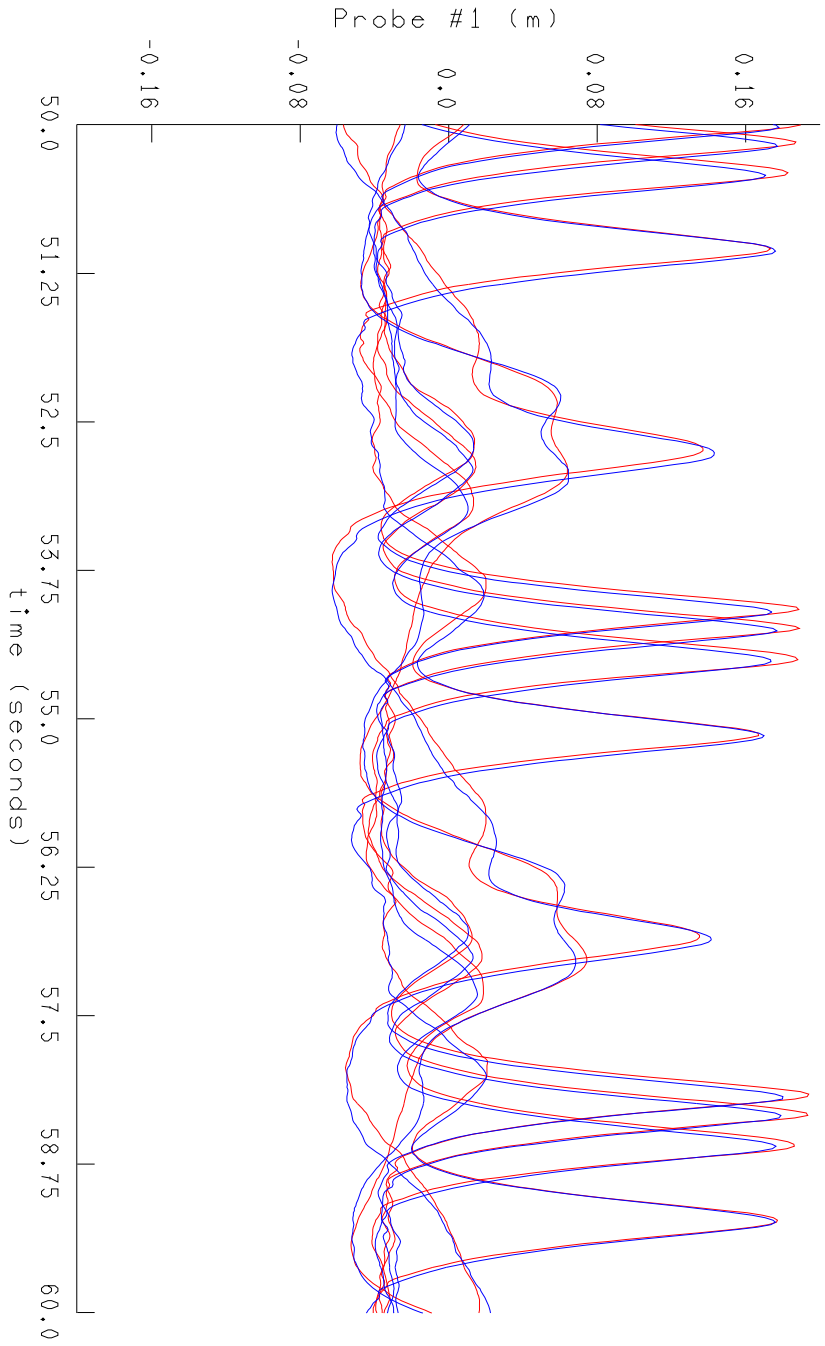

Fig. 6b: Surface elevations at Probes: 1-2-3-8-9-10
M4-5 : REGP4_H0P16_T4P105

before after

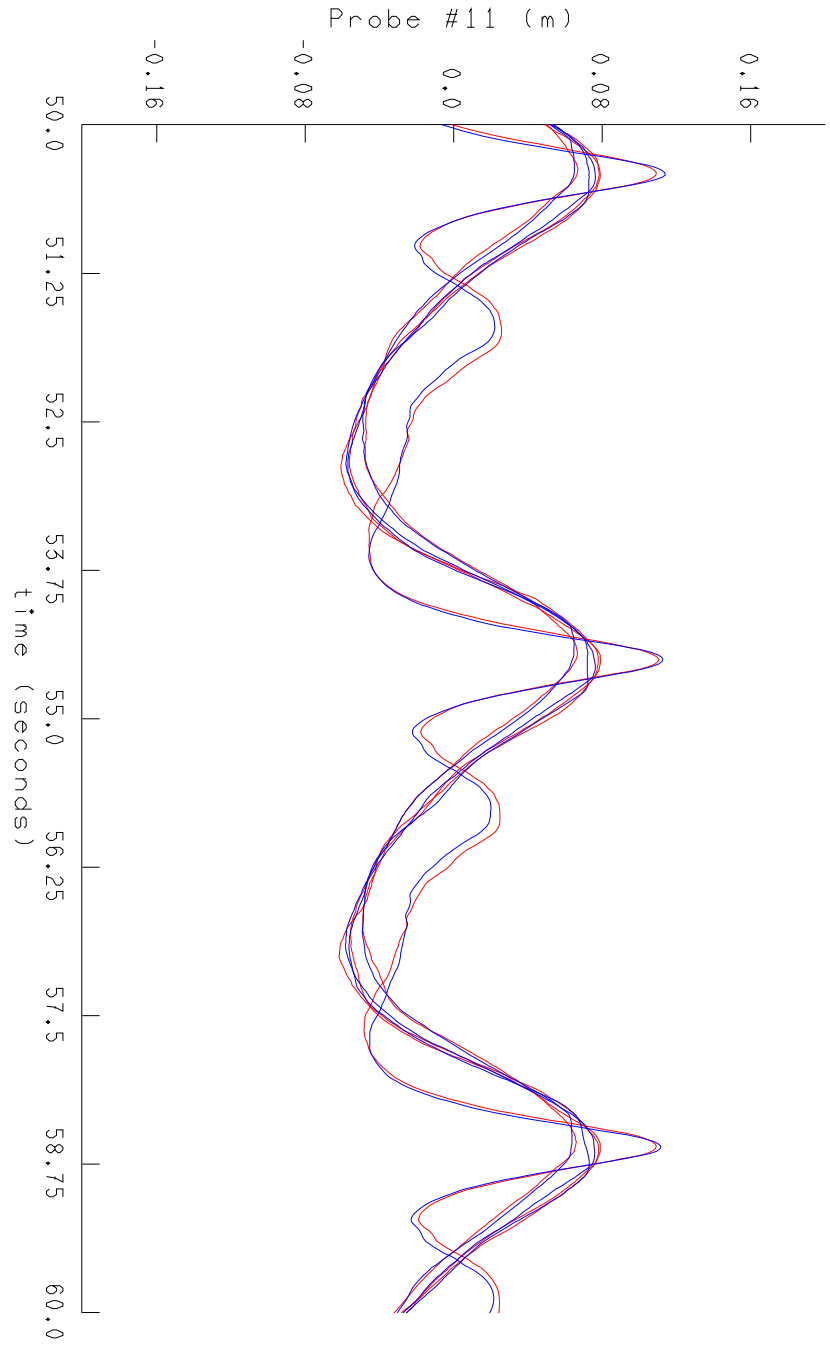

Fig. 6c: Surface elevations at Probes: 11-12-13-14
M4-5 : REGP4_H0P16_T4P105

before after

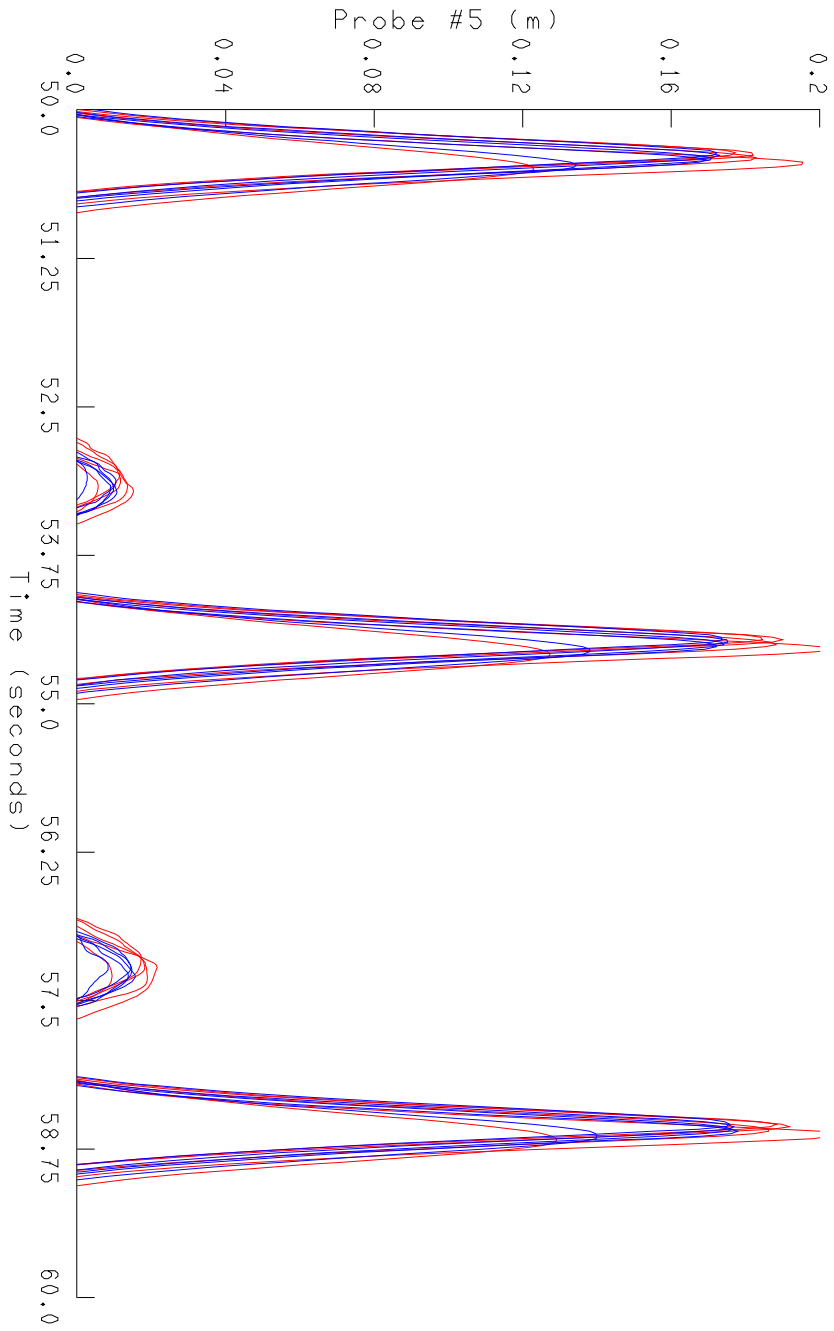

Fig. 6d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M4-5 : REGP4_H0P16_T4P105

before after

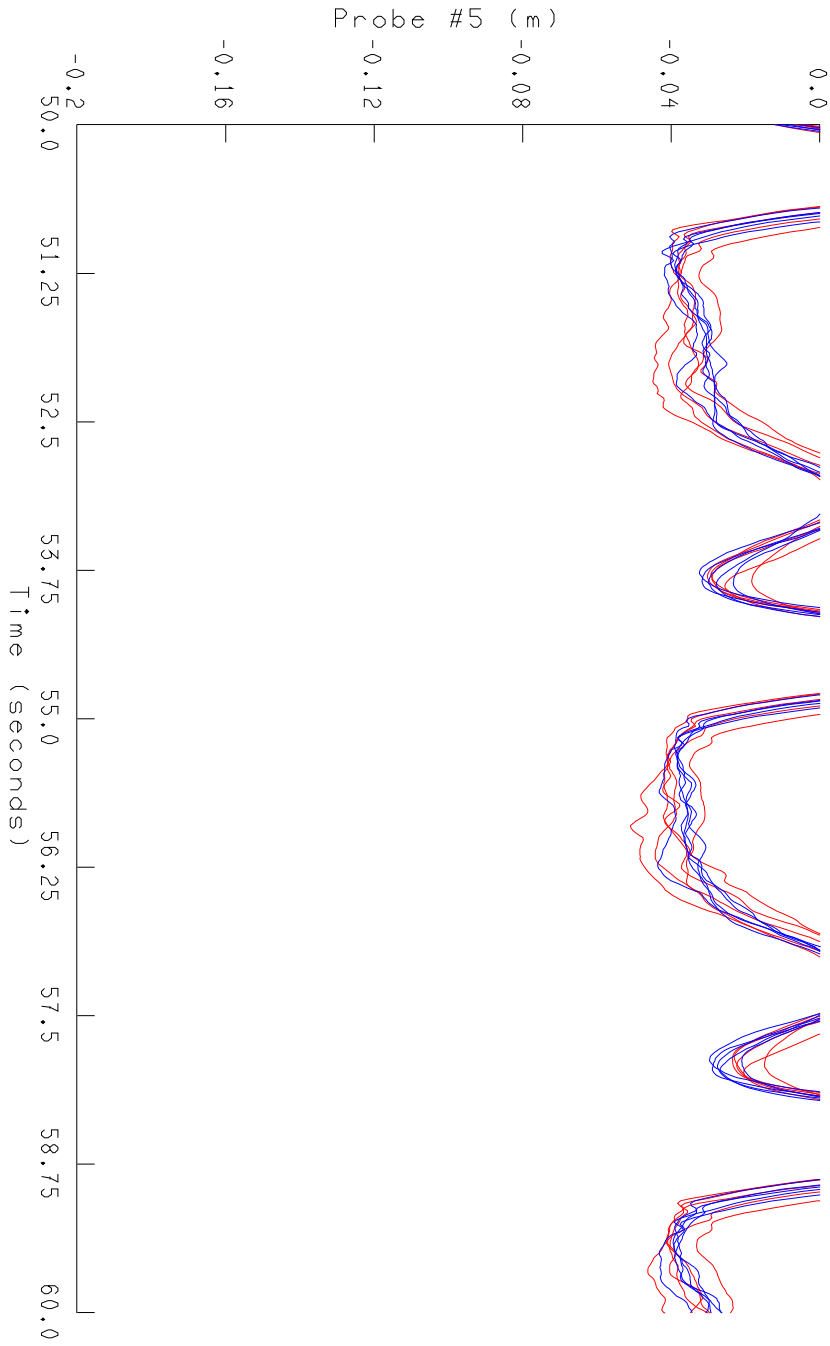

Fig. 6e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M4-5 : REGP4_H0P16_T4P105

before after

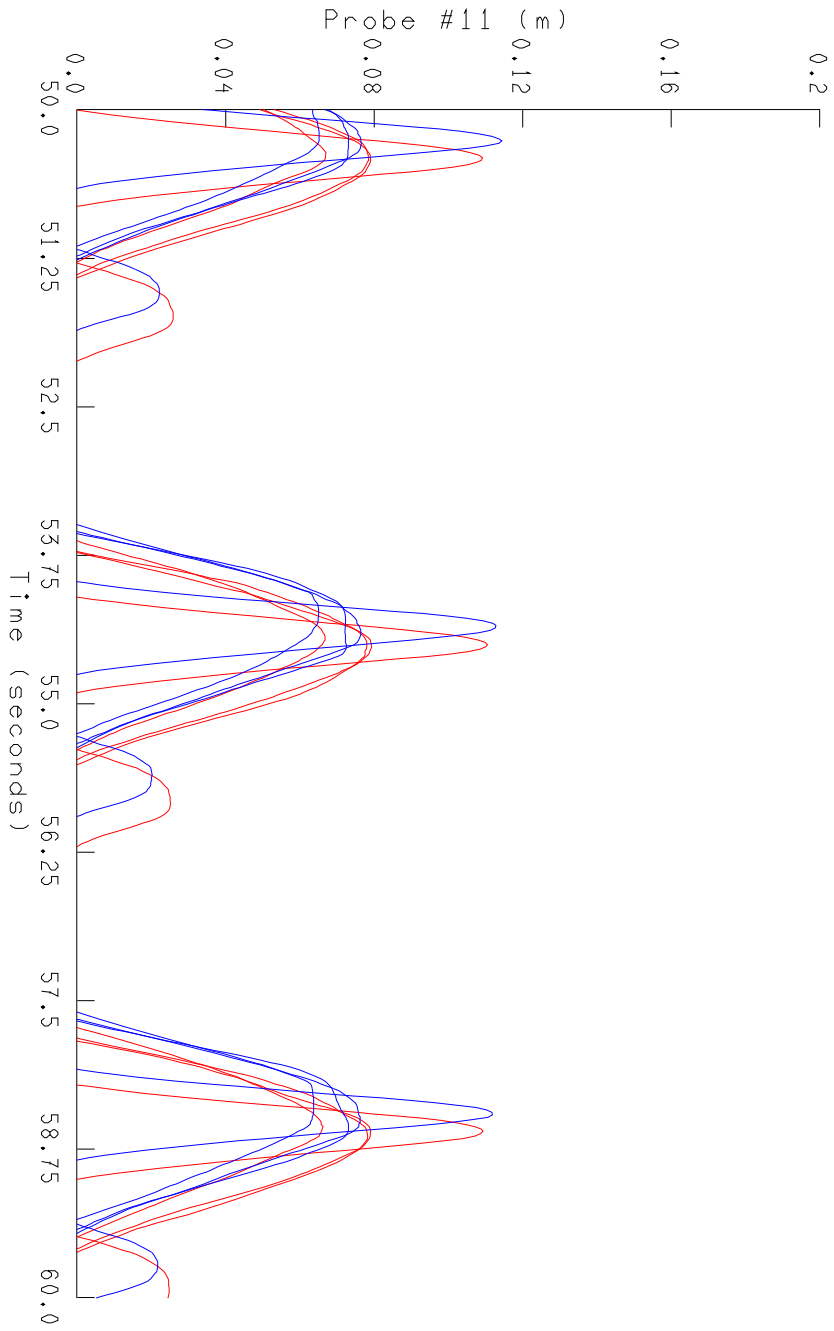

Fig. 6f: Surface elevations at Probes: 11-12-13-14 (Crest)
M4-5 : REGP4_H0P16_T4P105

before after

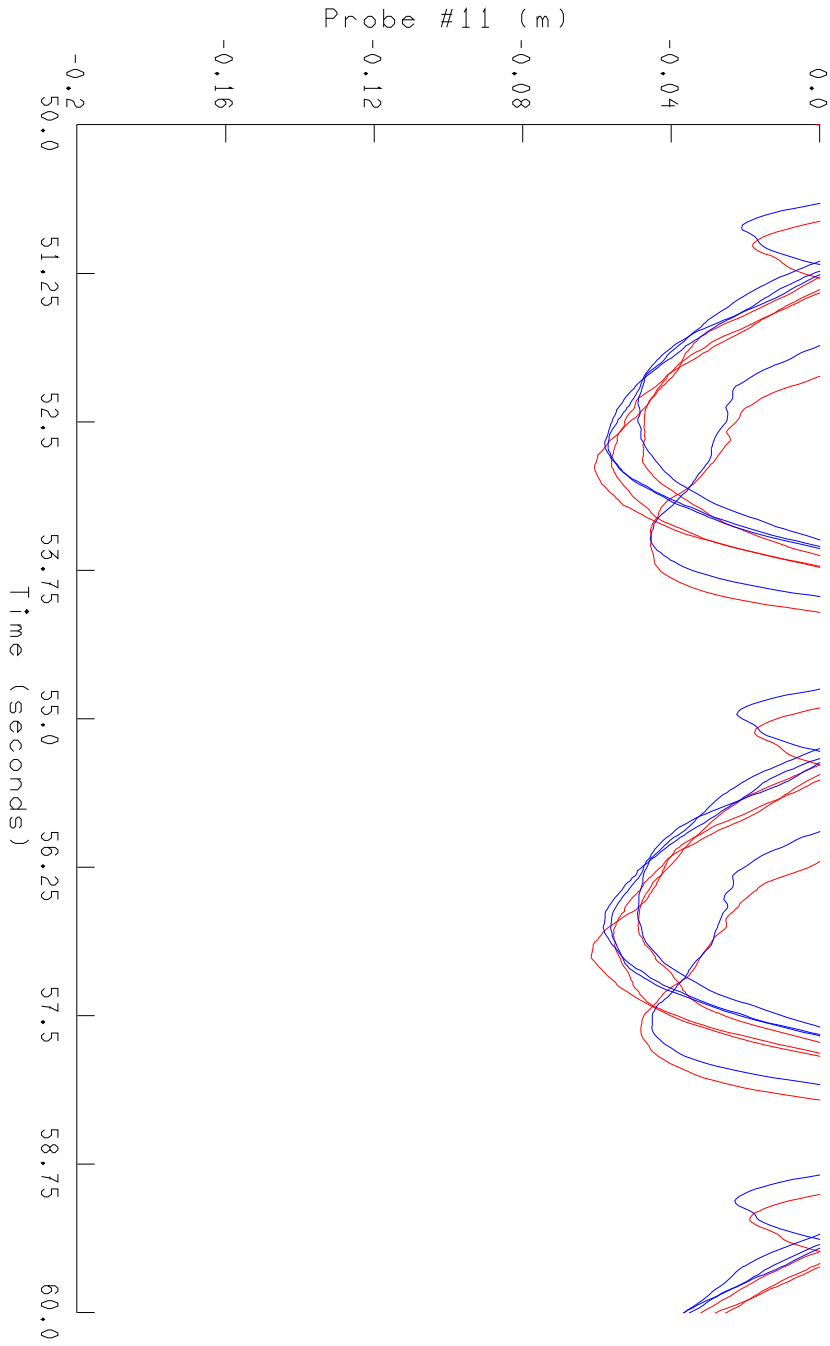

Fig. 6g: Surface elevations at Probes: 11-12-13-14 (Trough)
M4-5 : REGP4_H0P16_T4P105

before after

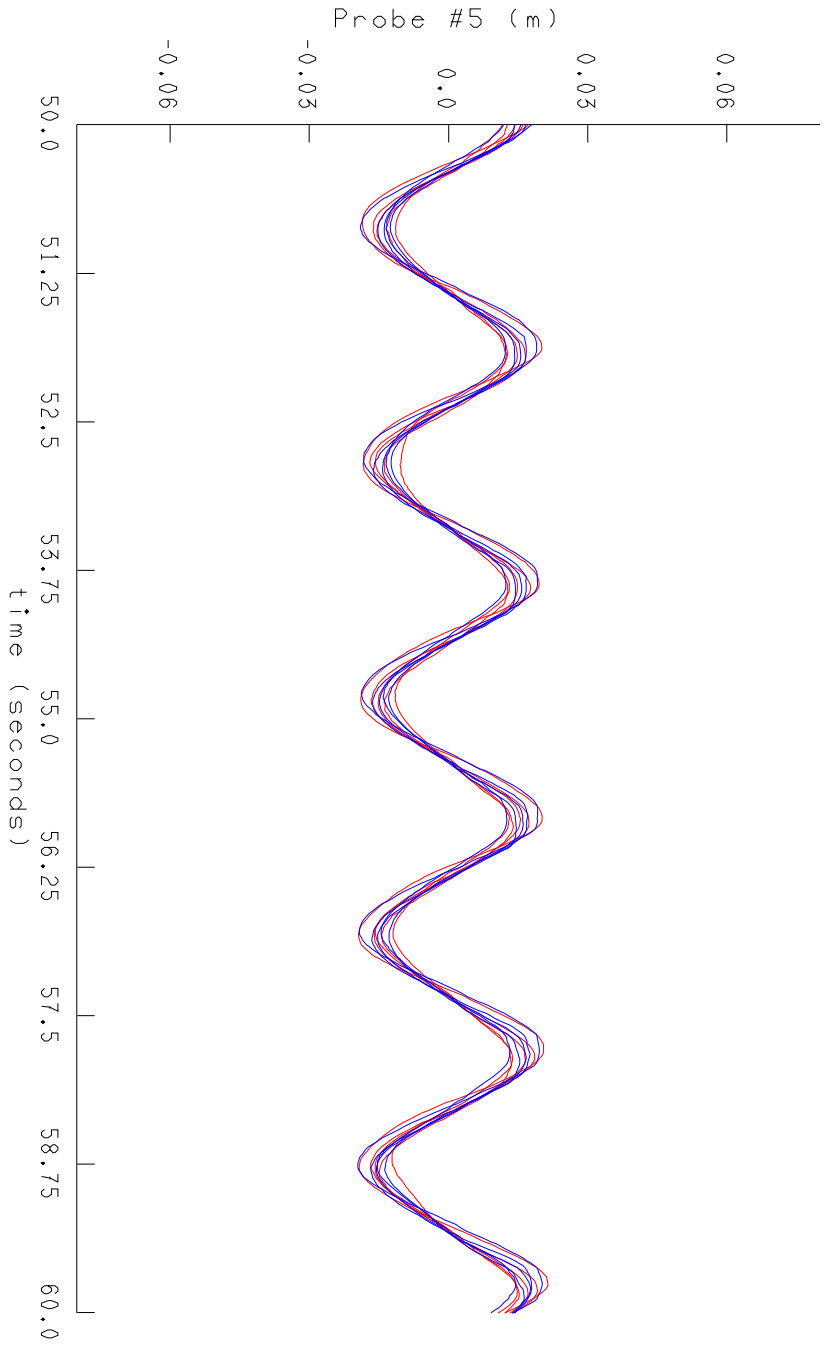

Fig. 7a: Surface elevations at Probes: 5-4-3-6-7
M5-1 : REGP5_H0P04_T1P977

before after

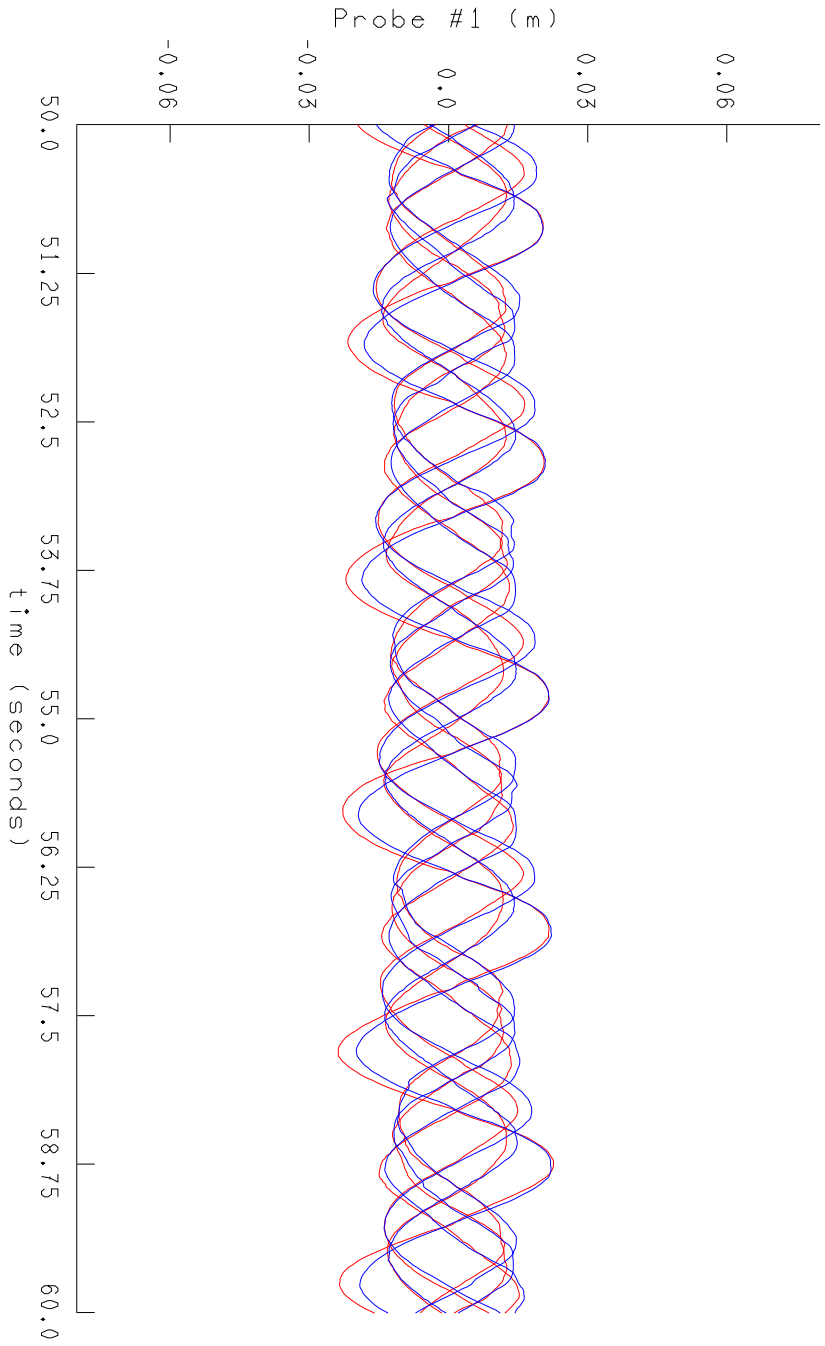

Fig. 7b: Surface elevations at Probes: 1-2-3-8-9-10
M5-1 : REGP5_H0P04_T1P977

before after

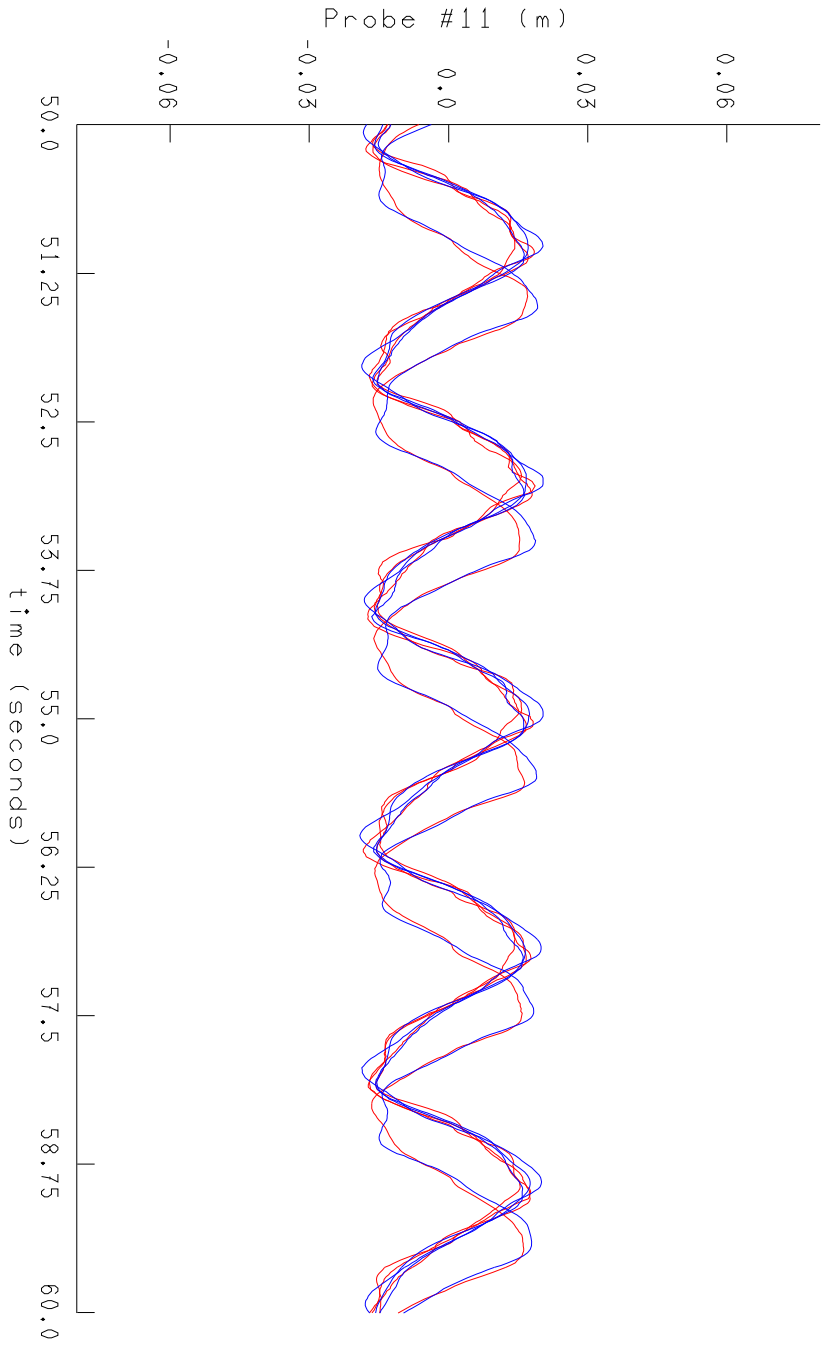

Fig. 7c: Surface elevations at Probes: 11-12-13-14
M5-1 : REGP5_H0P04_T1P977

before after

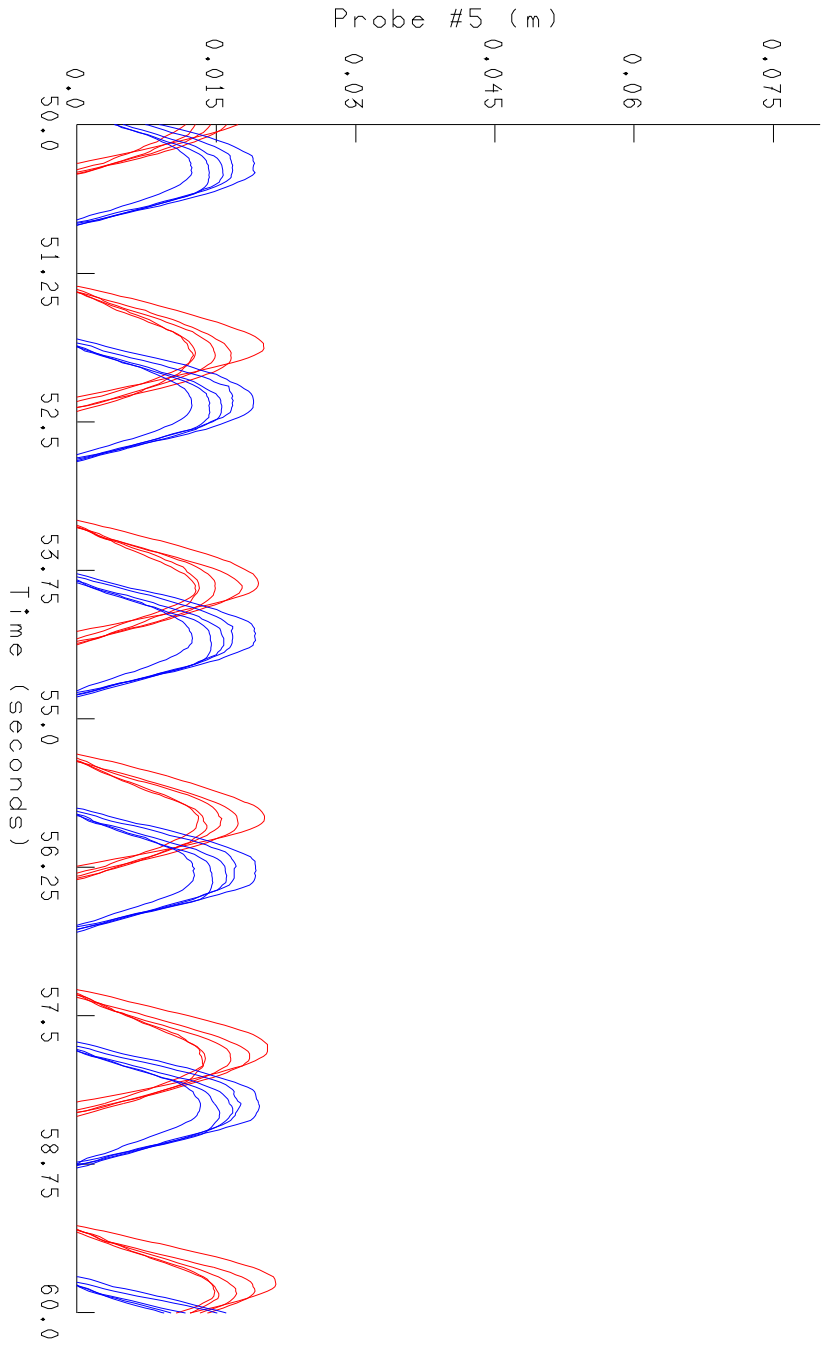

Fig. 7d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M5-1 : REGP5_H0P04_T1P977

before after

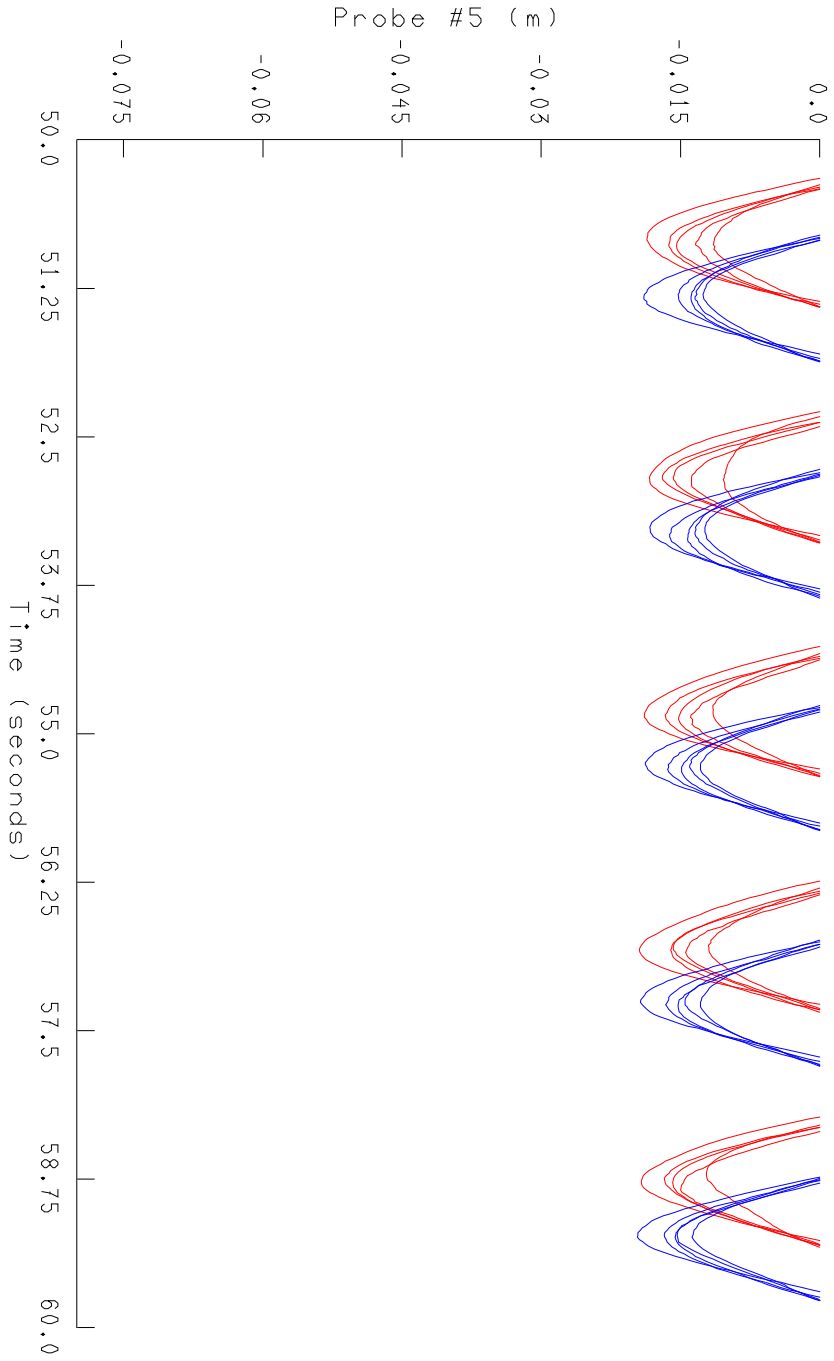

Fig. 7e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M5-1 : REGP5_H0P04_T1P977

before after

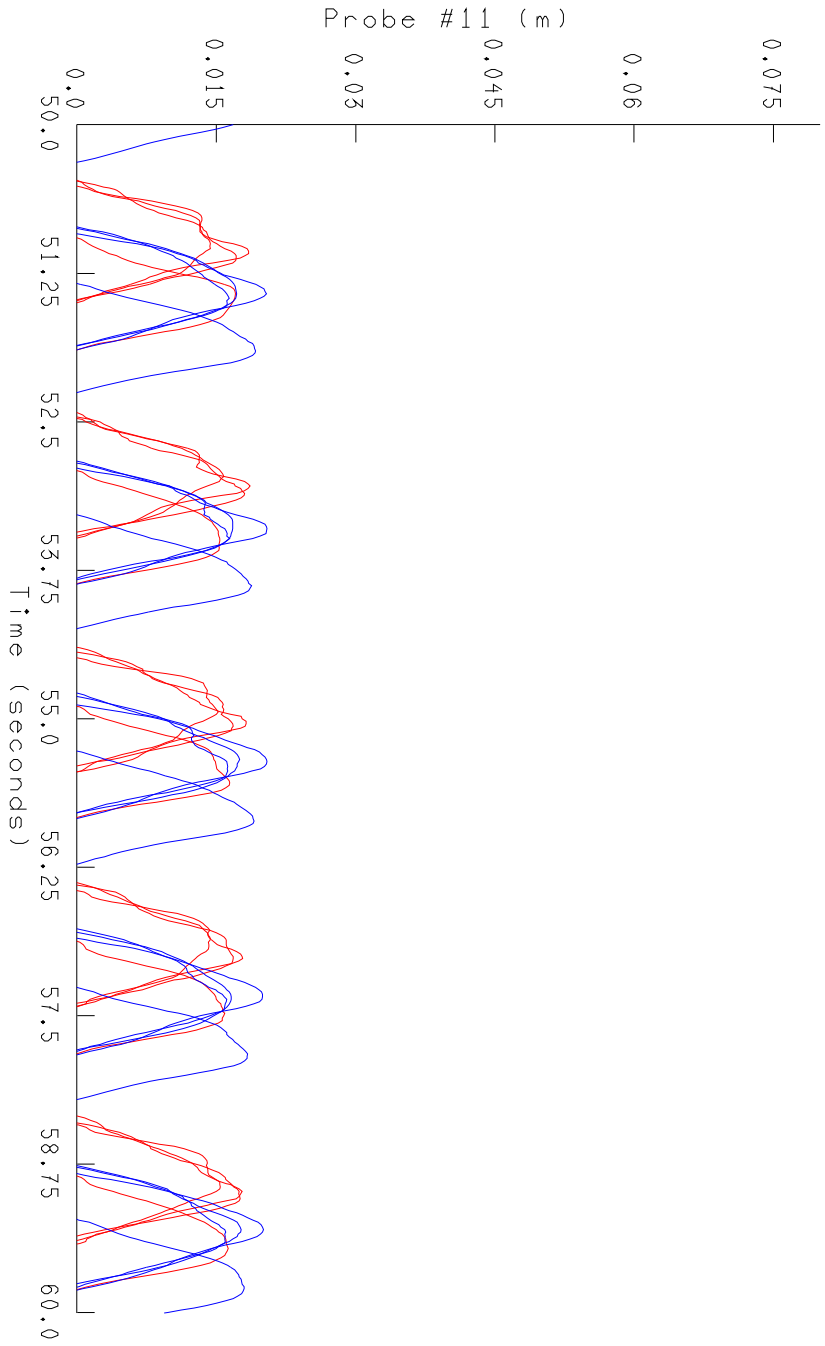

Fig. 7f: Surface elevations at Probes: 11-12-13-14 (Crest)
M5-1 : REGP5_H0P04_T1P977

before after

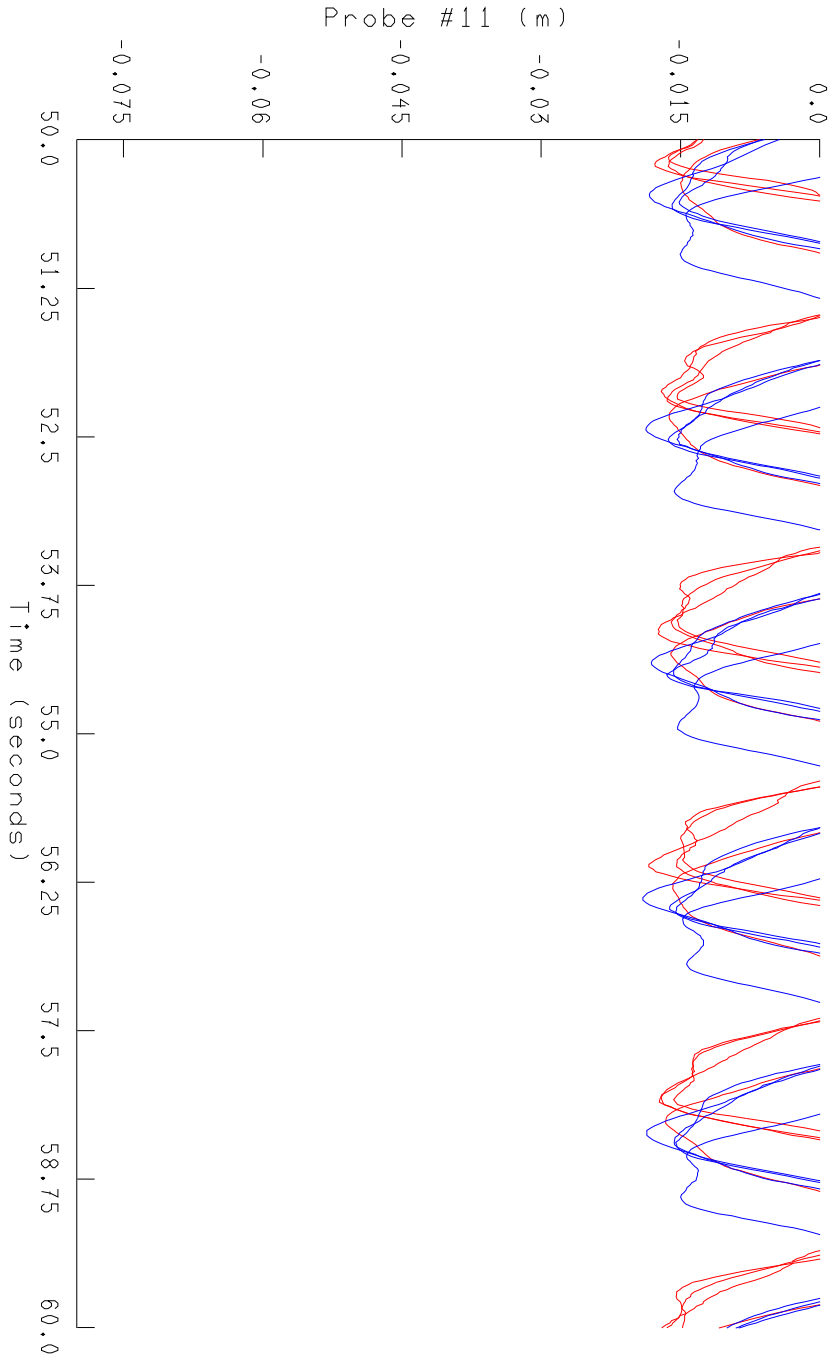

Fig. 7g: Surface elevations at Probes: 11-12-13-14 (Trough)
M5-1 : REGP5_H0P04_T1P977

before after

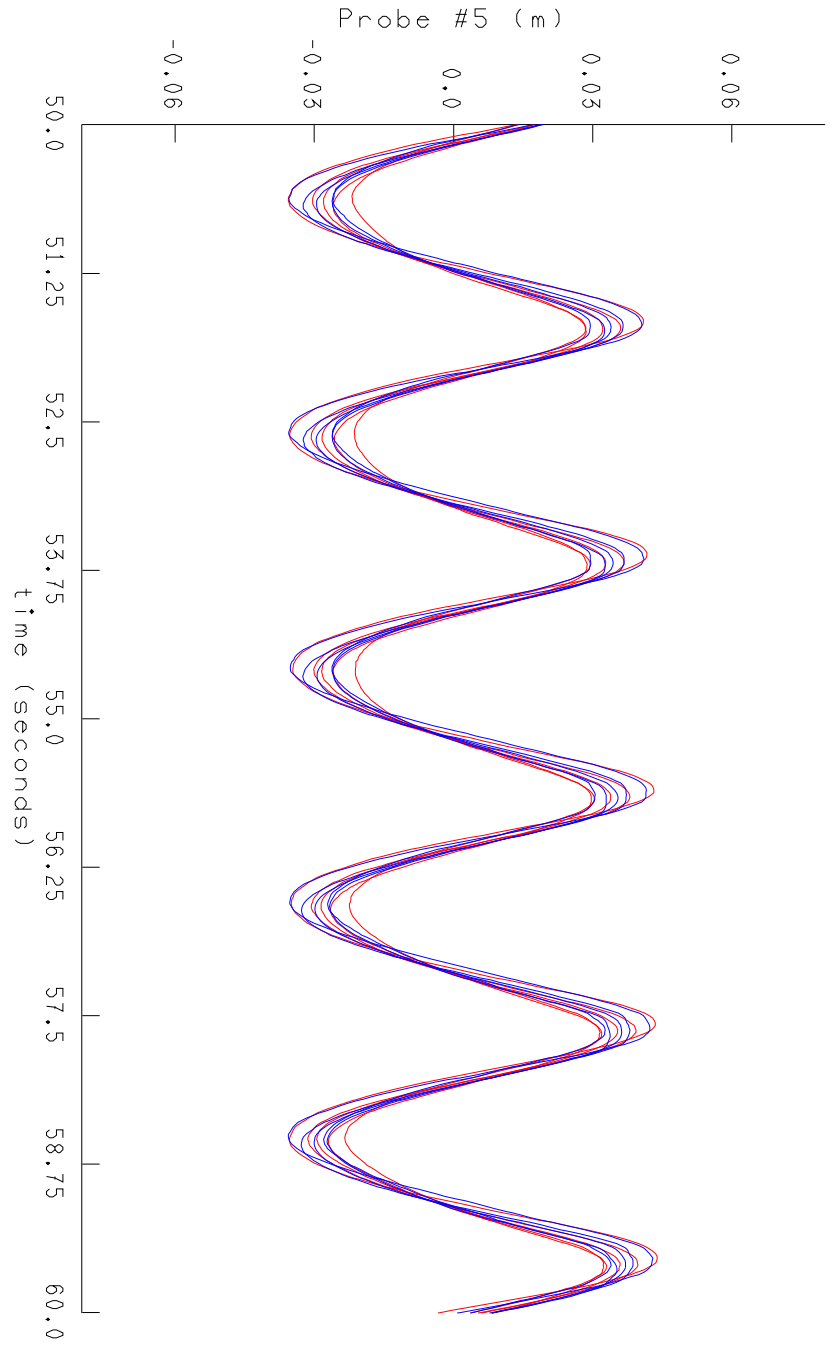

Fig. 8a: Surface elevations at Probes: 5-4-3-6-7
M5-2 : REGP5_H0P08_T1P977

before after

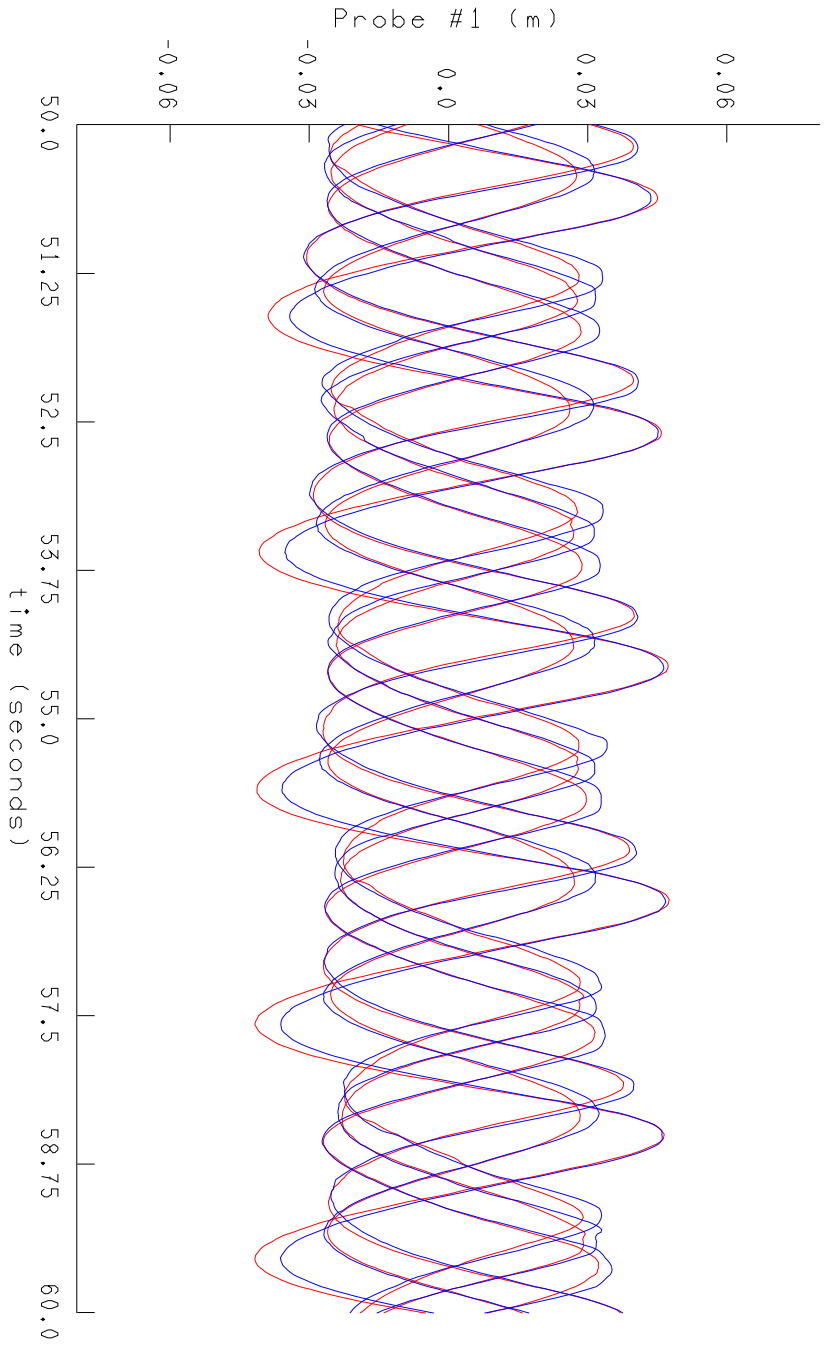

Fig. 8b: Surface elevations at Probes: 1-2-3-8-9-10
M5-2 : REGP5_H0P08_T1P977

before after

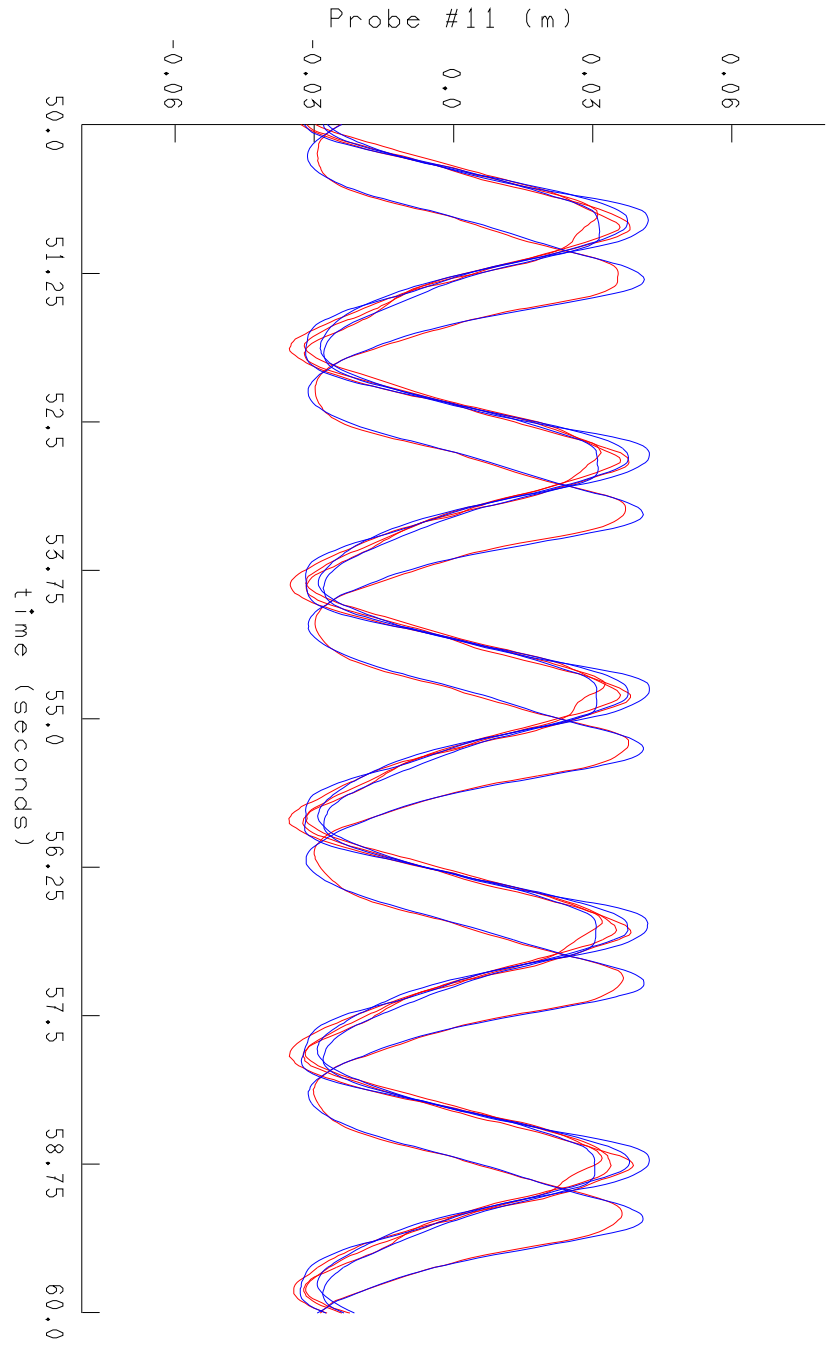

Fig. 8c: Surface elevations at Probes: 11-12-13-14
M5-2 : REGP5_H0P08_T1P977

before after

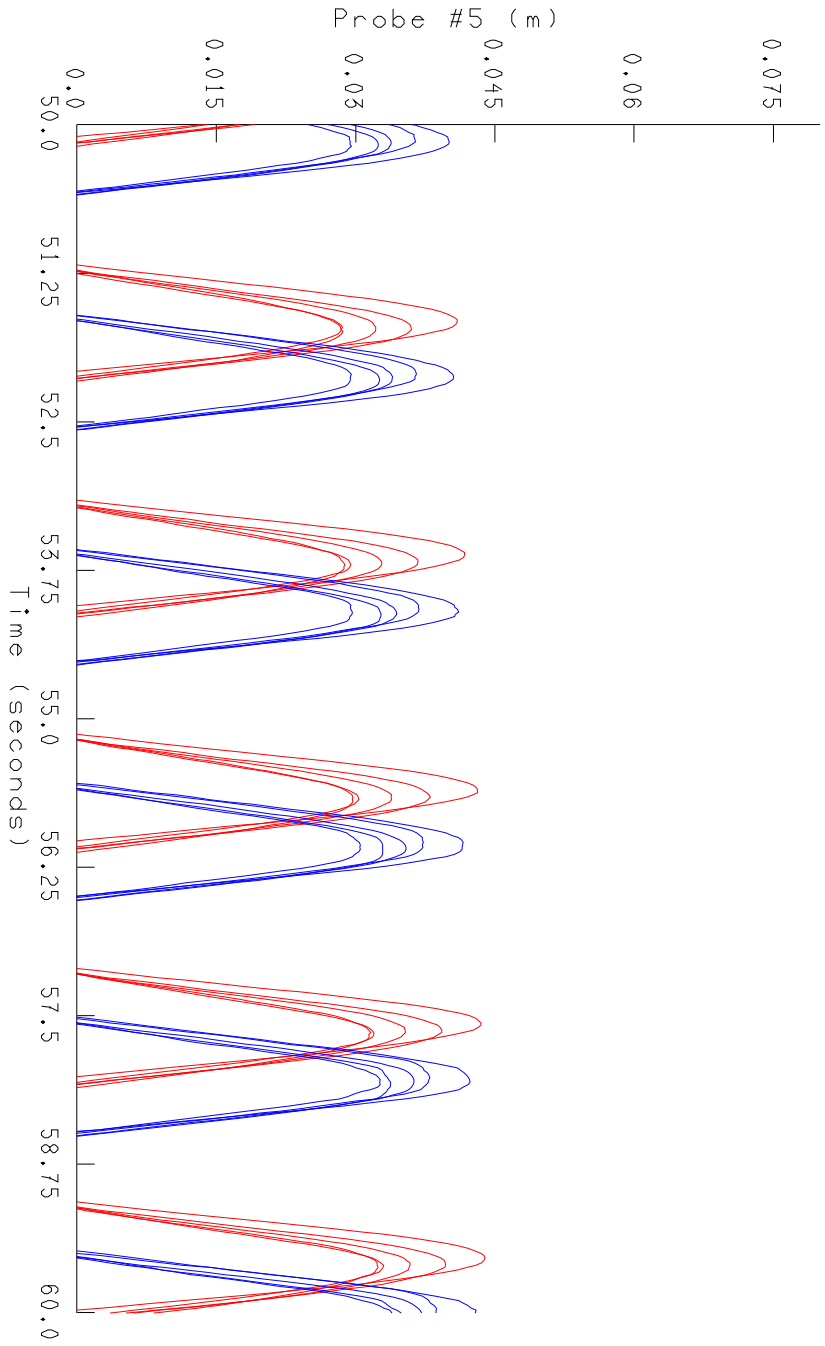

Fig. 8d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M5-2 : REGP5_H0P08_T1P977

before after

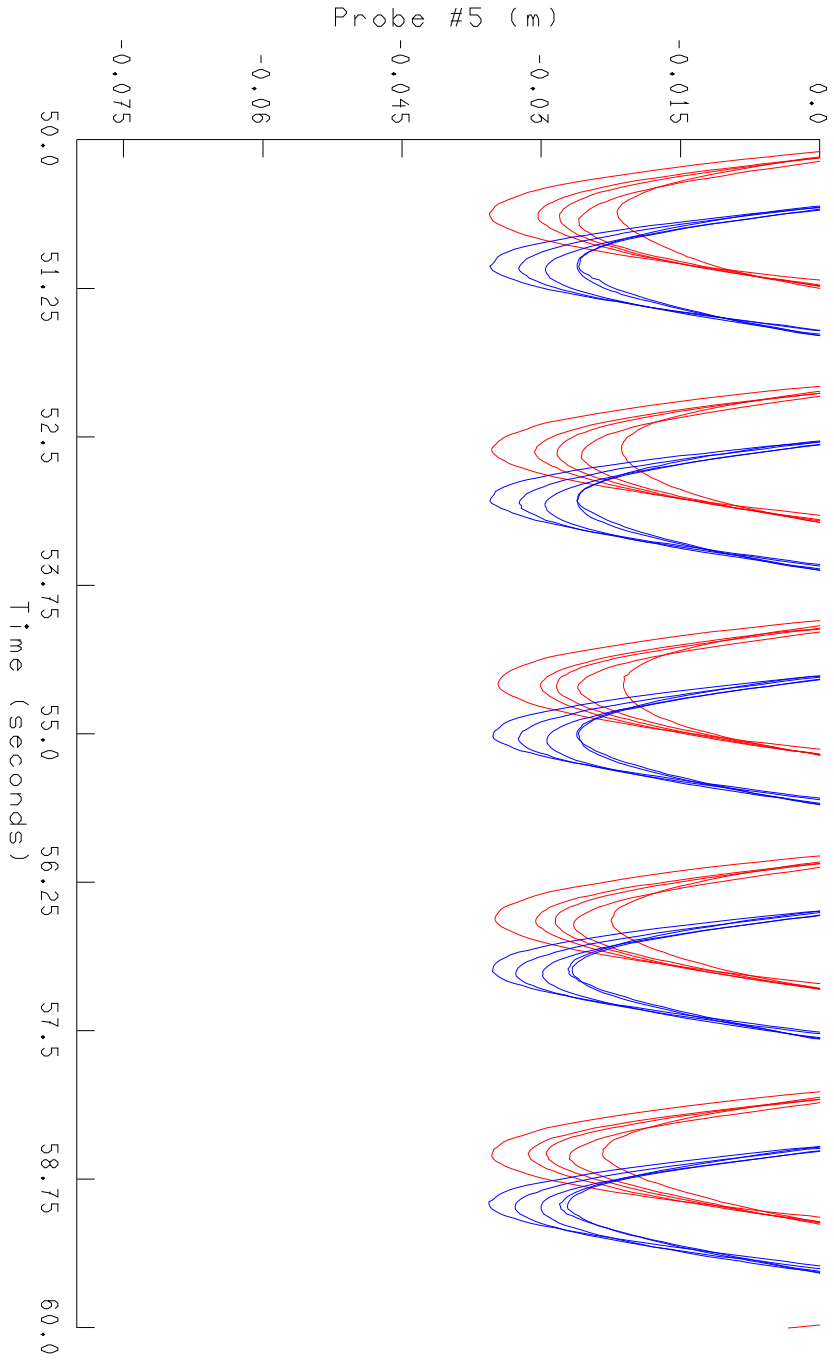

Fig. 8e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M5-2 : REGP5_H0P08_T1P977

before after

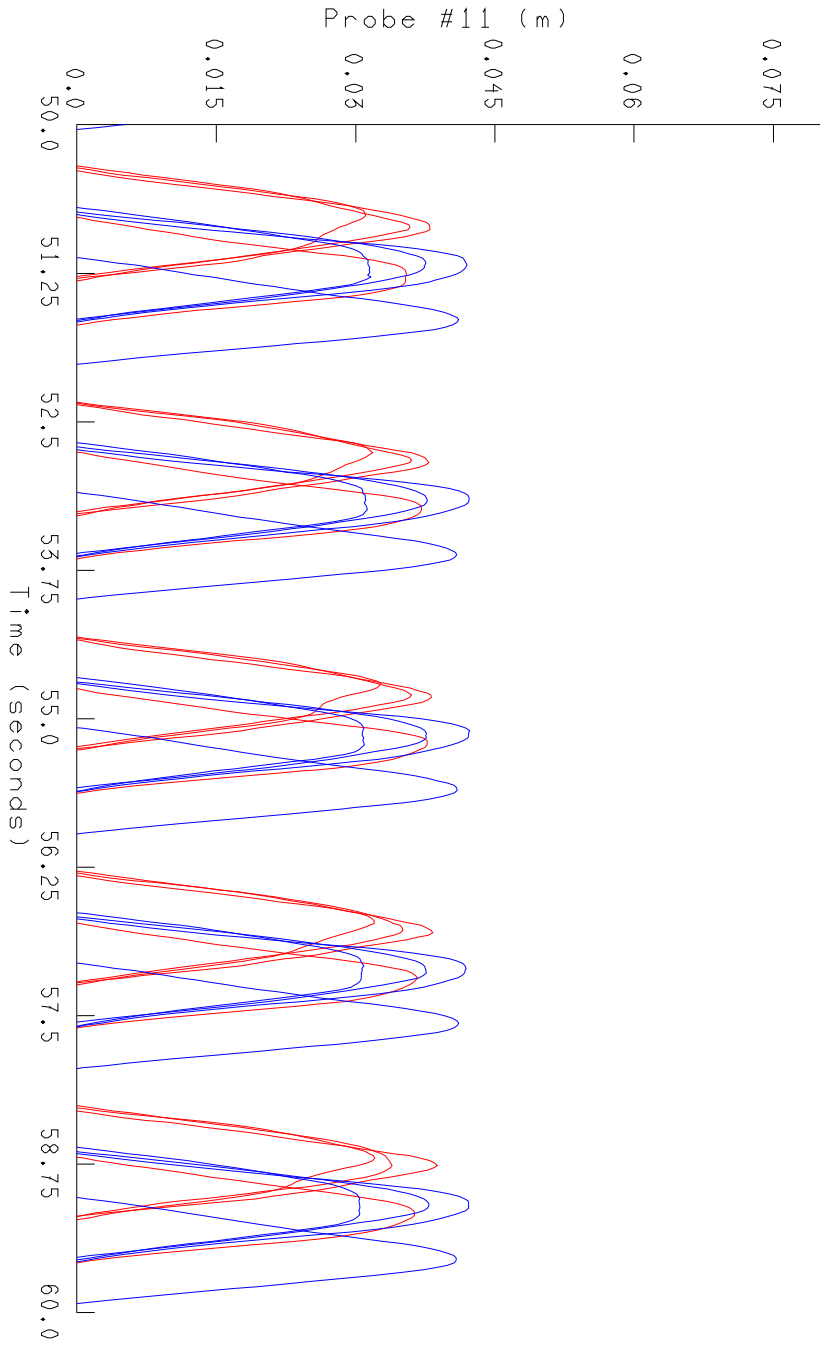

Fig. 8f: Surface elevations at Probes: 11-12-13-14 (Crest)
M5-2 : REGP5_H0P08_T1P977

before after

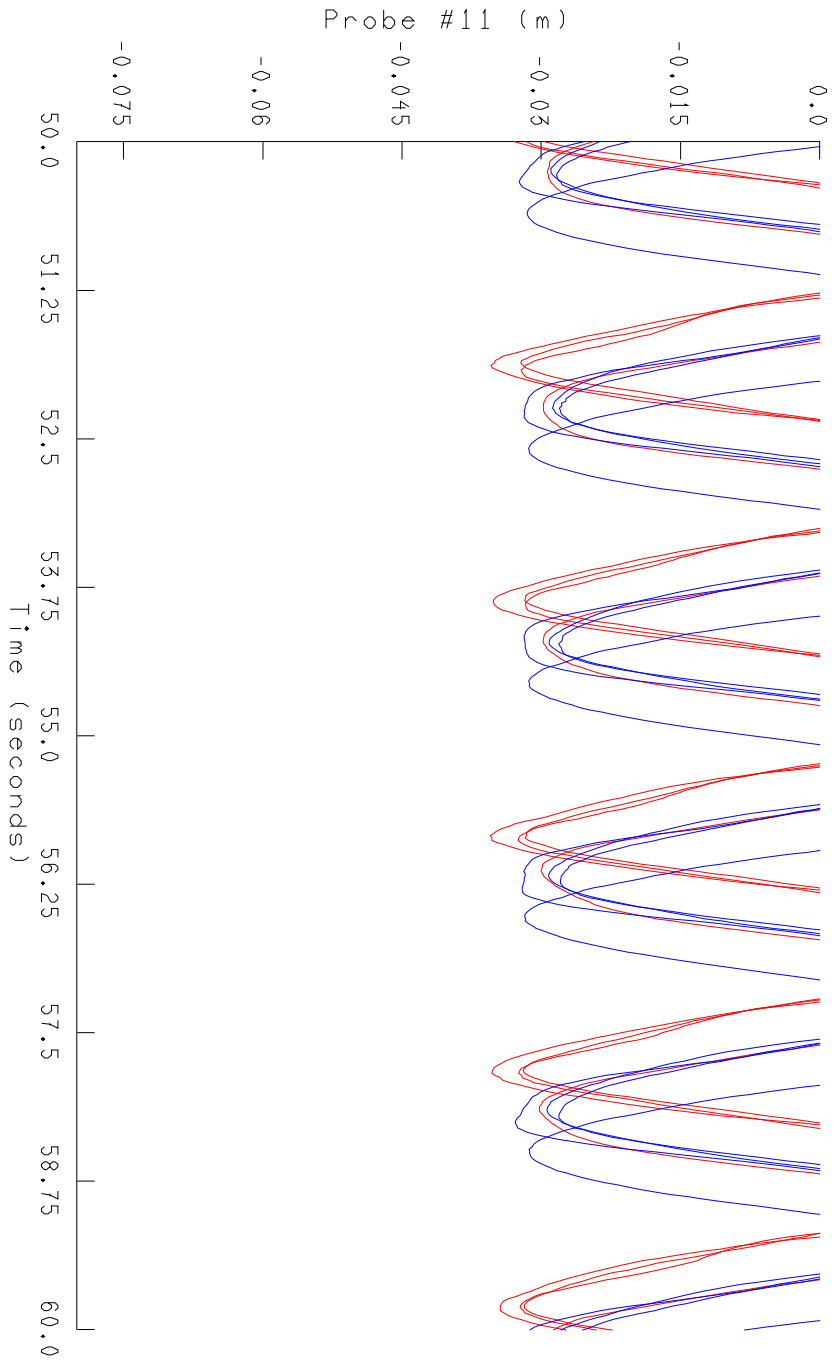

Fig. 8g: Surface elevations at Probes: 11-12-13-14 (Trough)
M5-2 : REGP5_H0P08_T1P977

before after

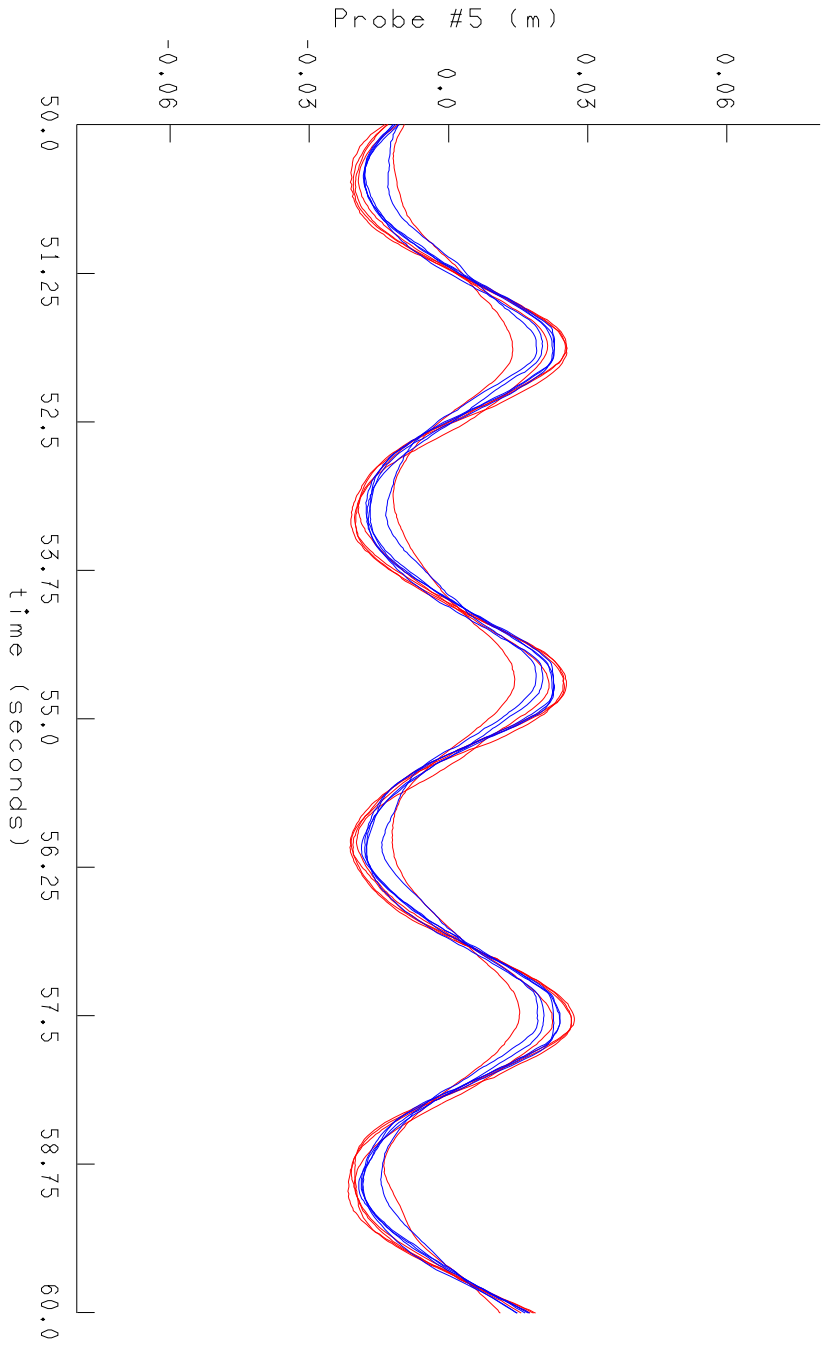

Fig. 9a: Surface elevations at Probes: 5-4-3-6-7
M5-3 : REGP5_H0P06_T2P829

before after

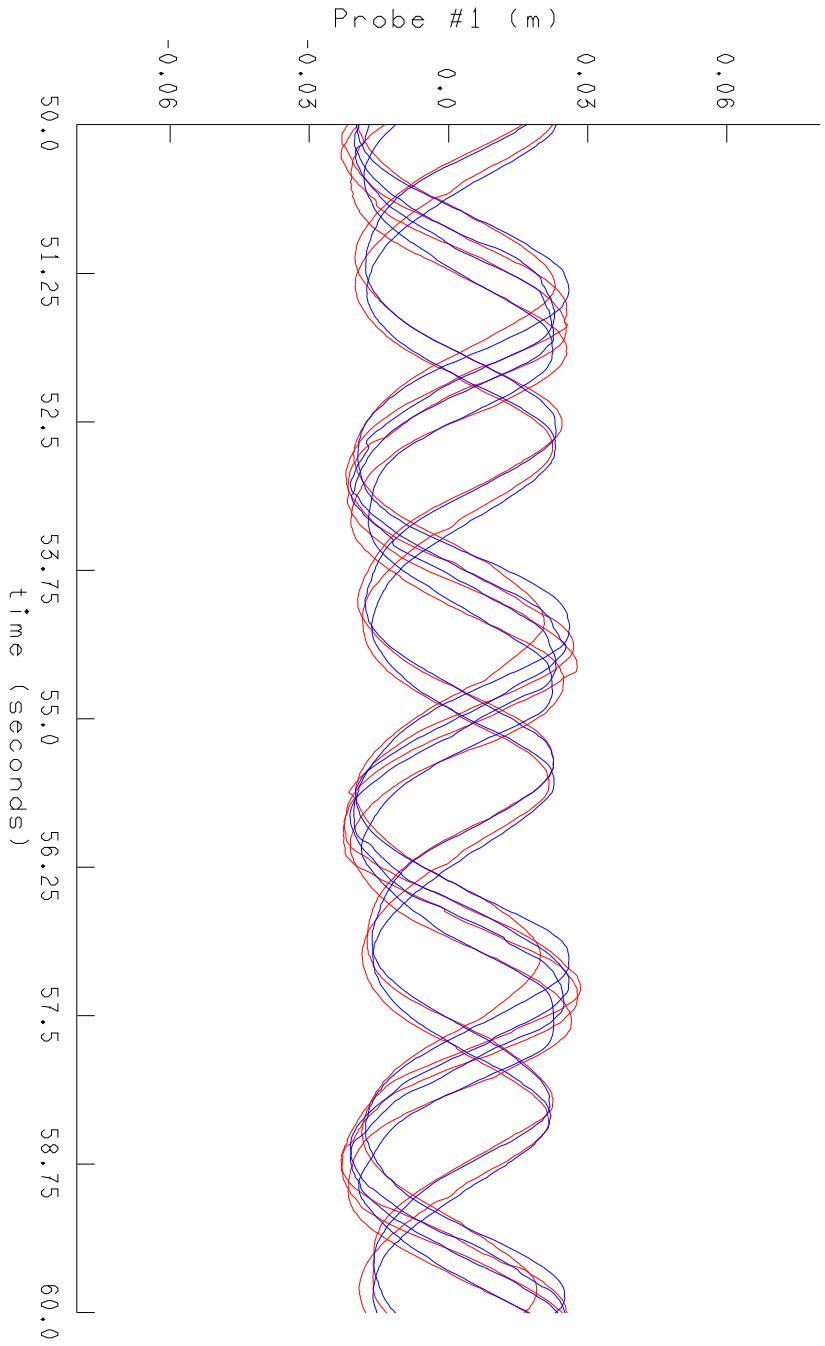

Fig. 9b: Surface elevations at Probes: 1-2-3-8-9-10
M5-3 : REGP5_H0P06_T2P829

before after

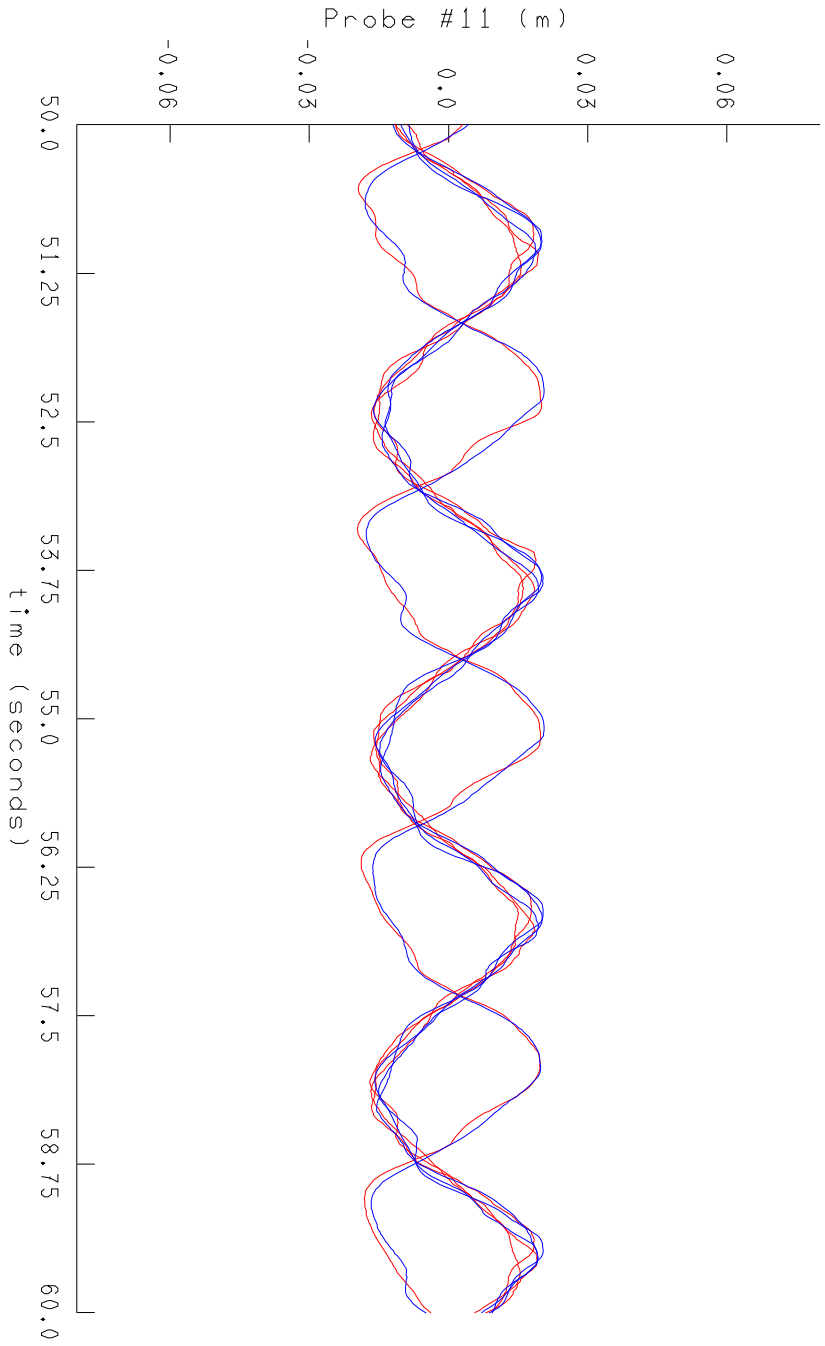

Fig. 9c: Surface elevations at Probes: 11-12-13-14
M5-3 : REGP5_H0P06_T2P829

before after

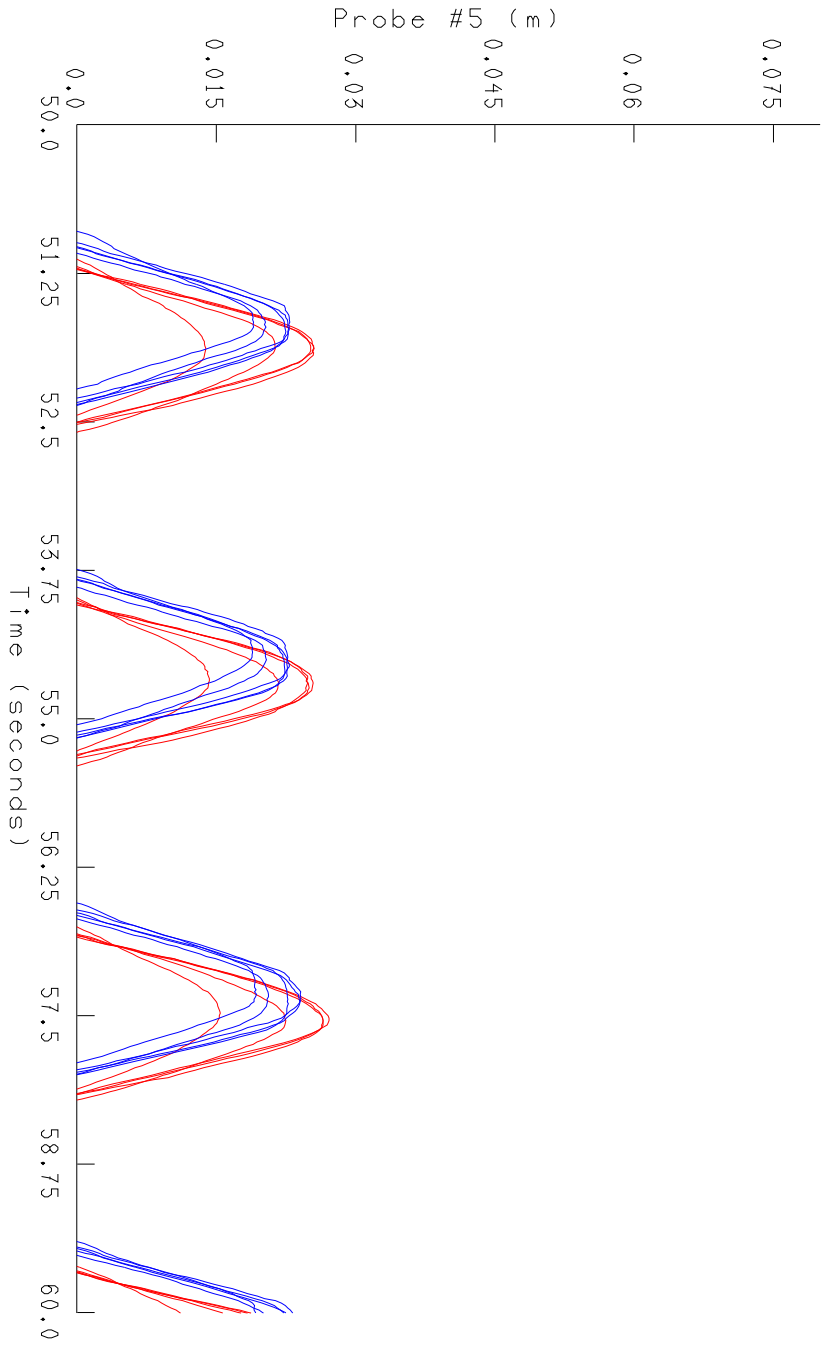

Fig. 9d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M5-3 : REGP5_H0P06_T2P829

before after

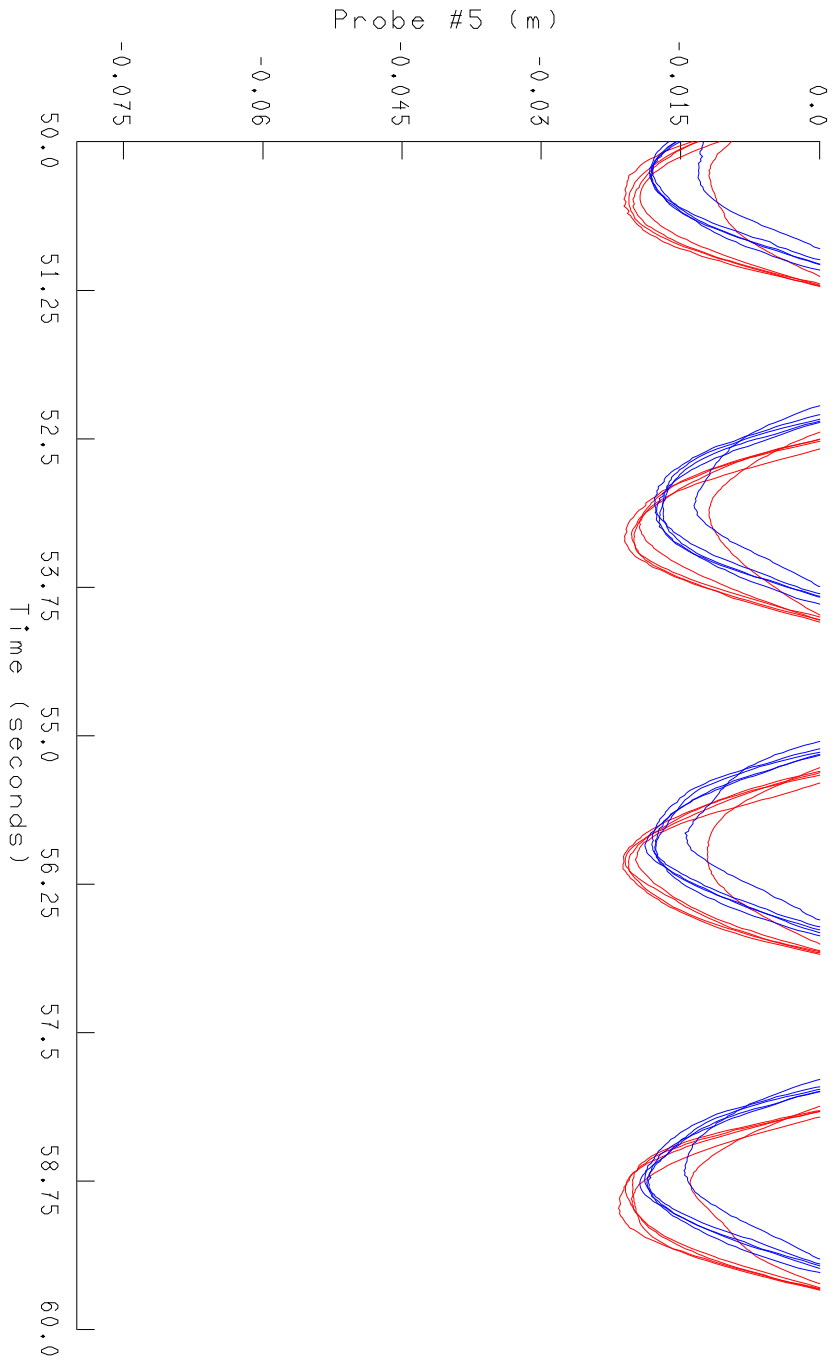

Fig. 9e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M5-3 : REGP5_H0P06_T2P829

before after

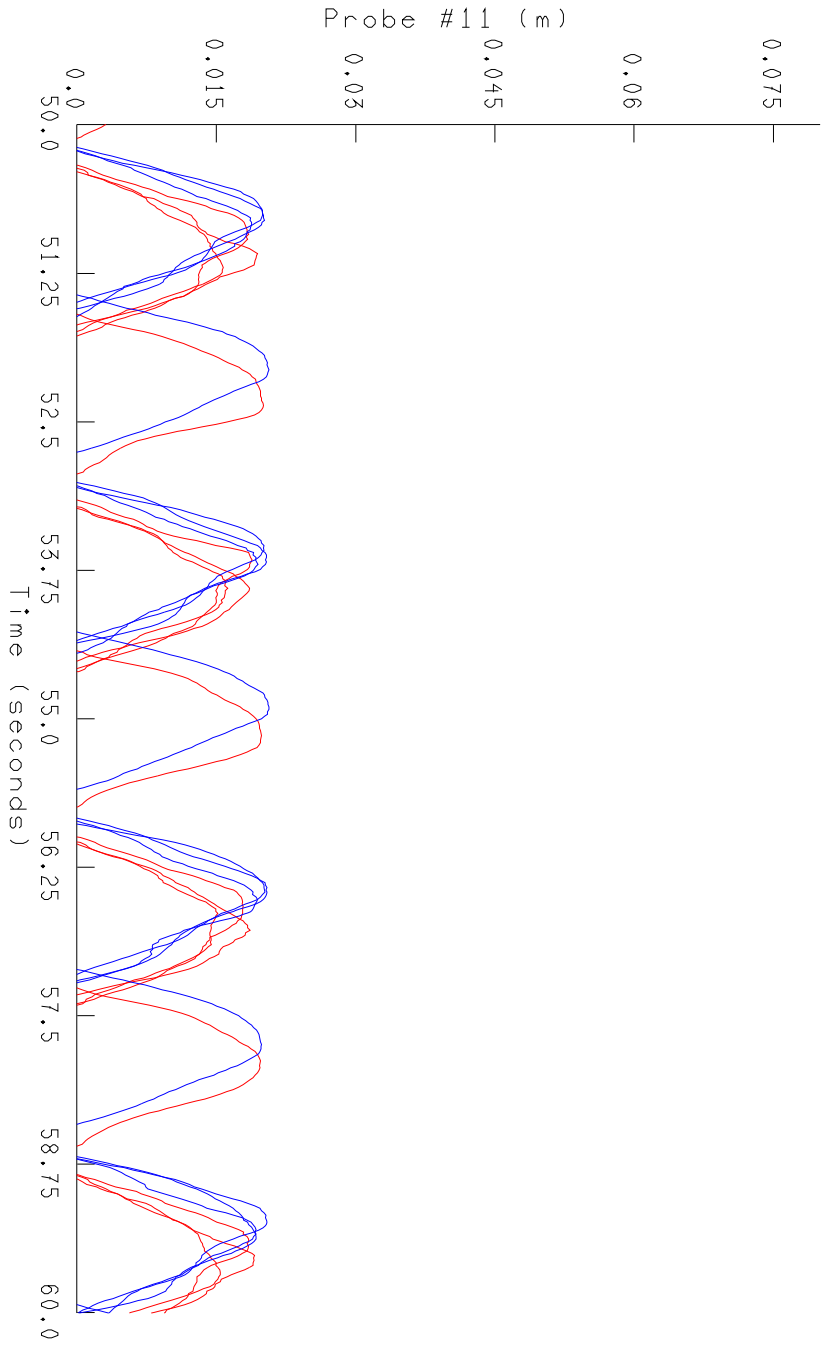

Fig. 9f: Surface elevations at Probes: 11-12-13-14 (Crest)
M5-3 : REGP5_H0P06_T2P829

before after

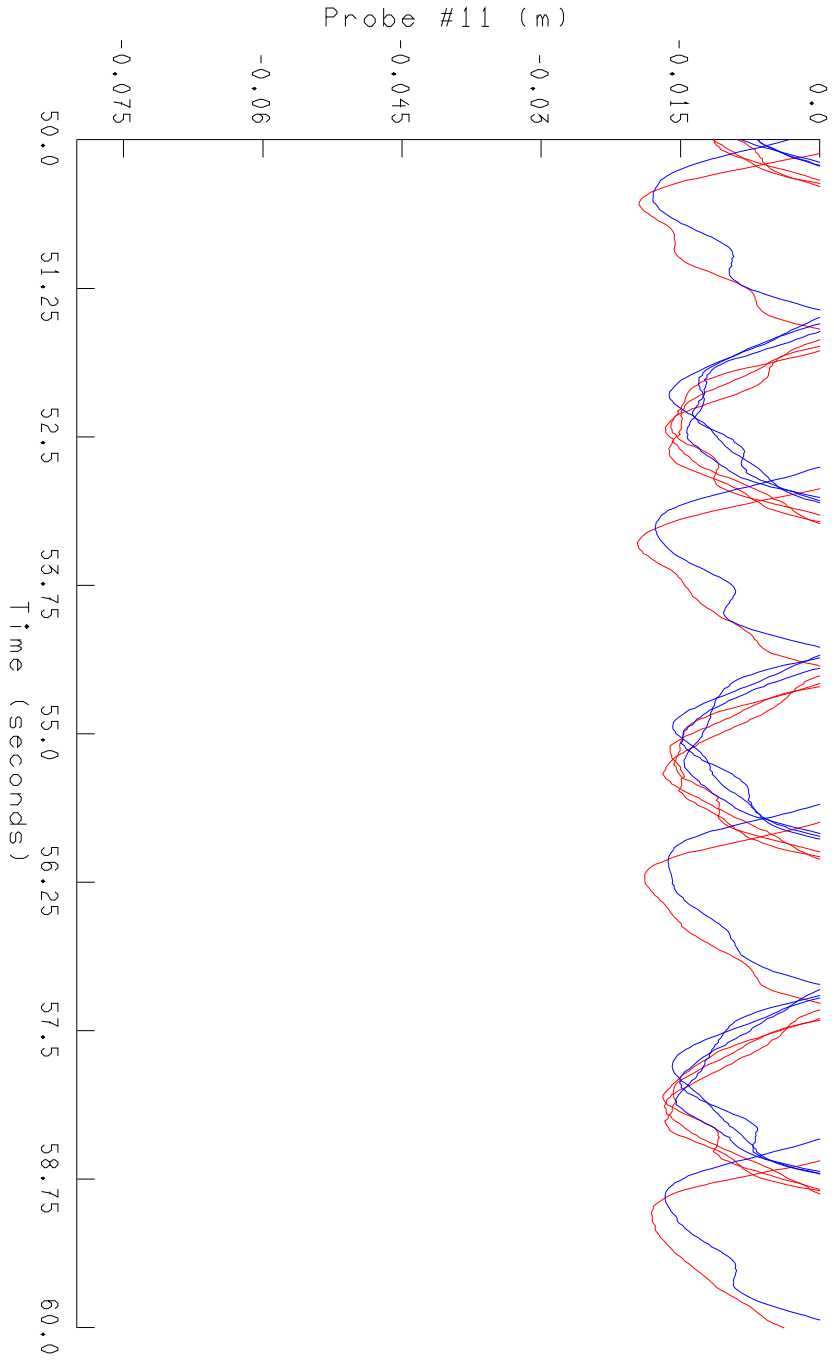

Fig. 9g: Surface elevations at Probes: 11-12-13-14 (Trough)
M5-3 : REGP5_H0P06_T2P829

before after

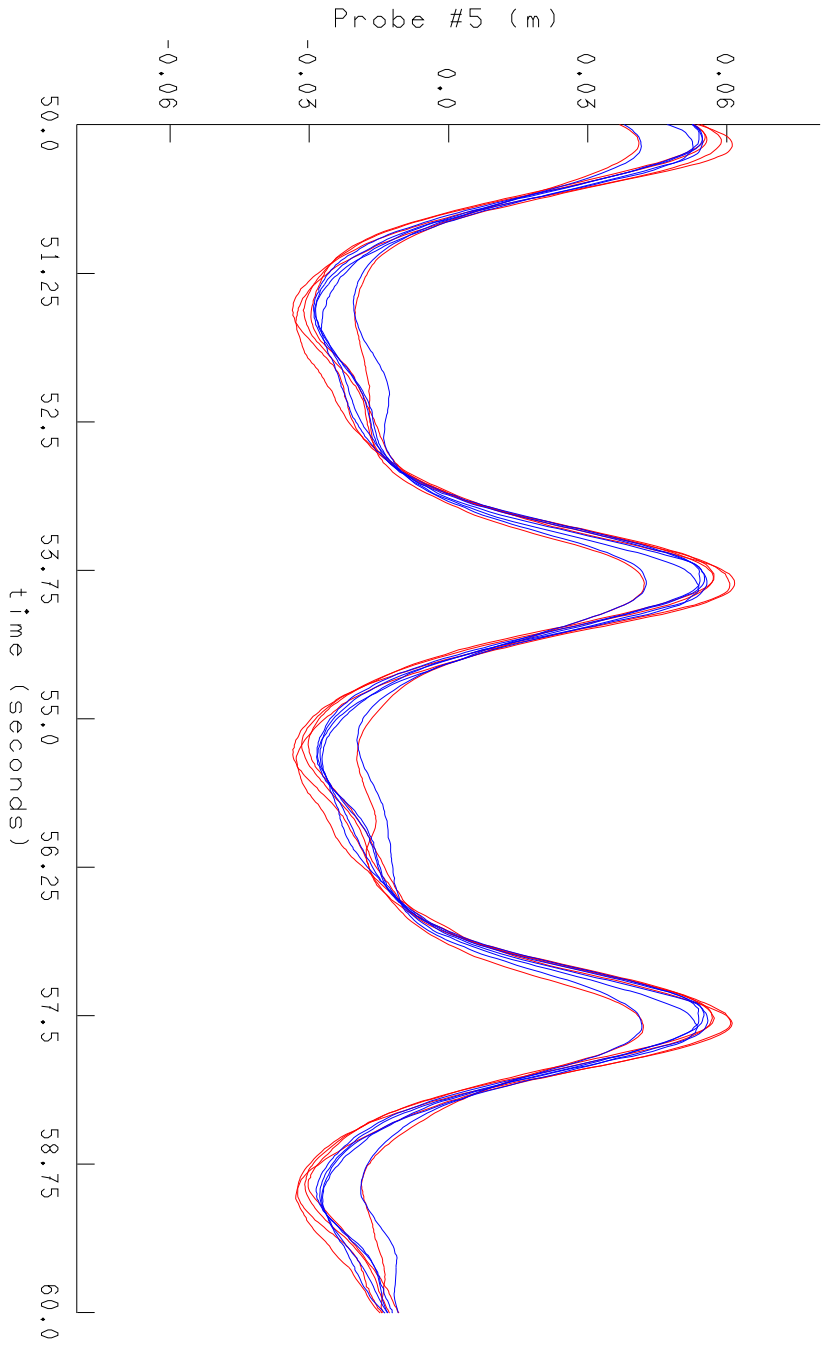

Fig. 10a: Surface elevations at Probes: 5-4-3-6-7
M5-4 : REGP5_H0P08_T3P704

before after

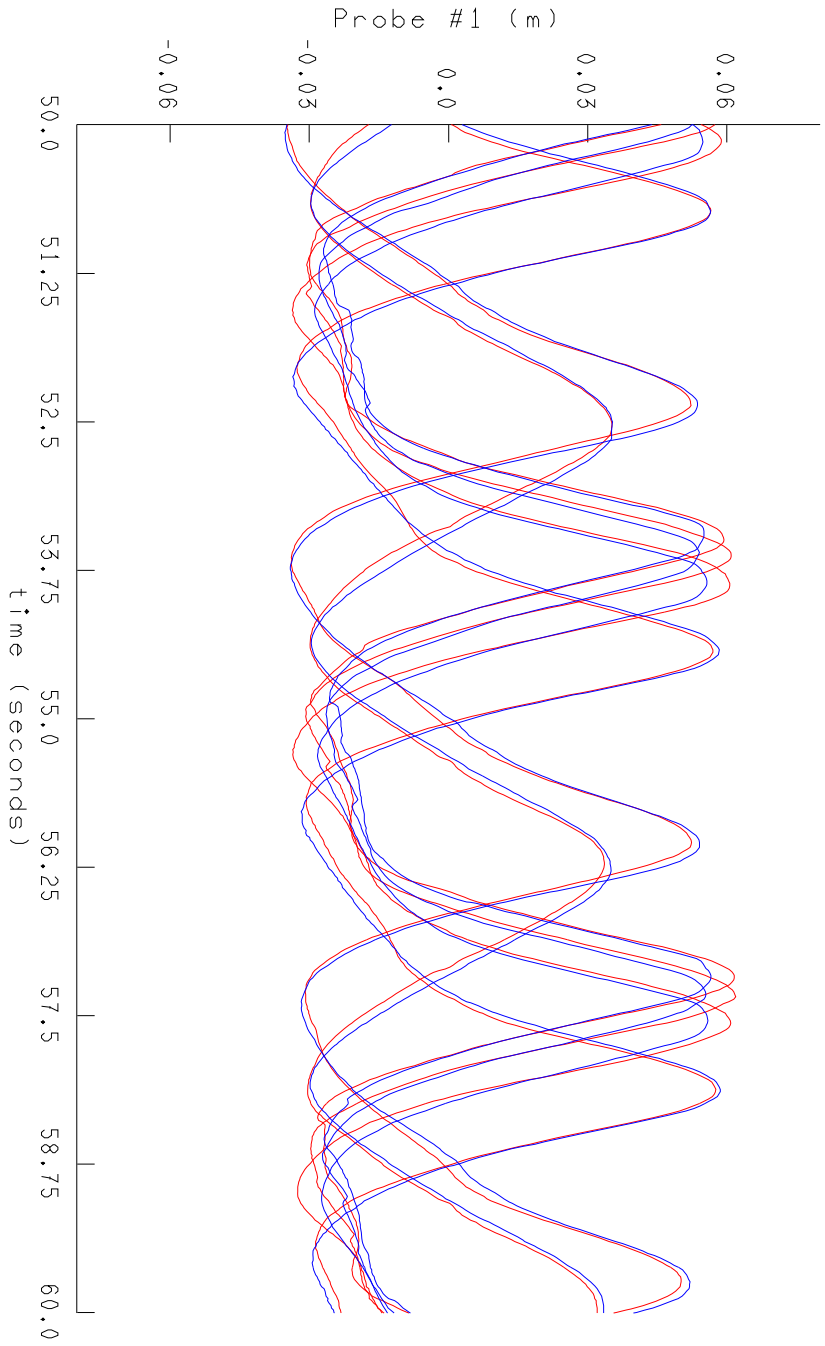

Fig. 10b: Surface elevations at Probes: 1-2-3-8-9-10
M5-4 : REGP5_H0P08_T3P704

before after

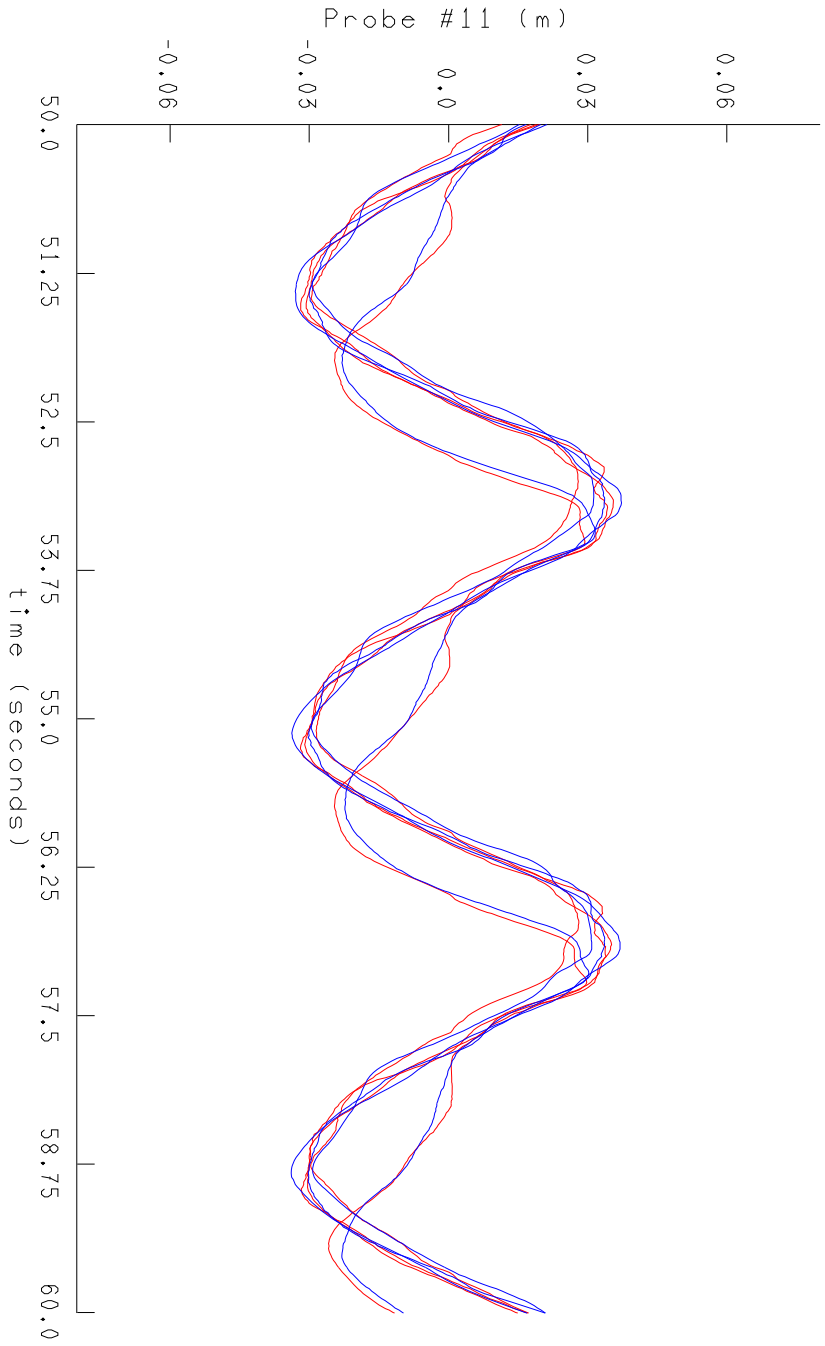

Fig. 10c: Surface elevations at Probes: 11-12-13-14
M5-4 : REGP5_H0P08_T3P704

before after

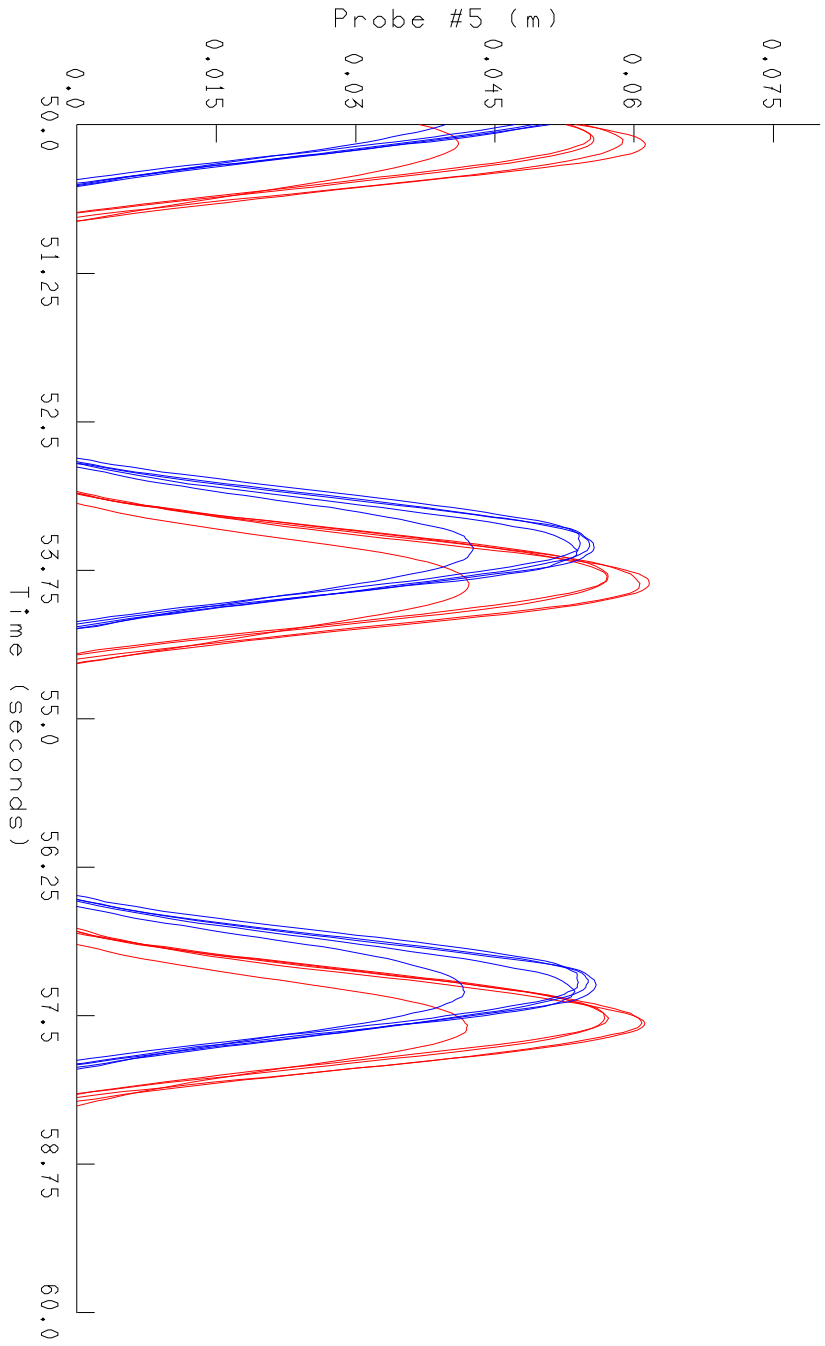

Fig. 10d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M5-4 : REGP5_H0P08_T3P704

before after

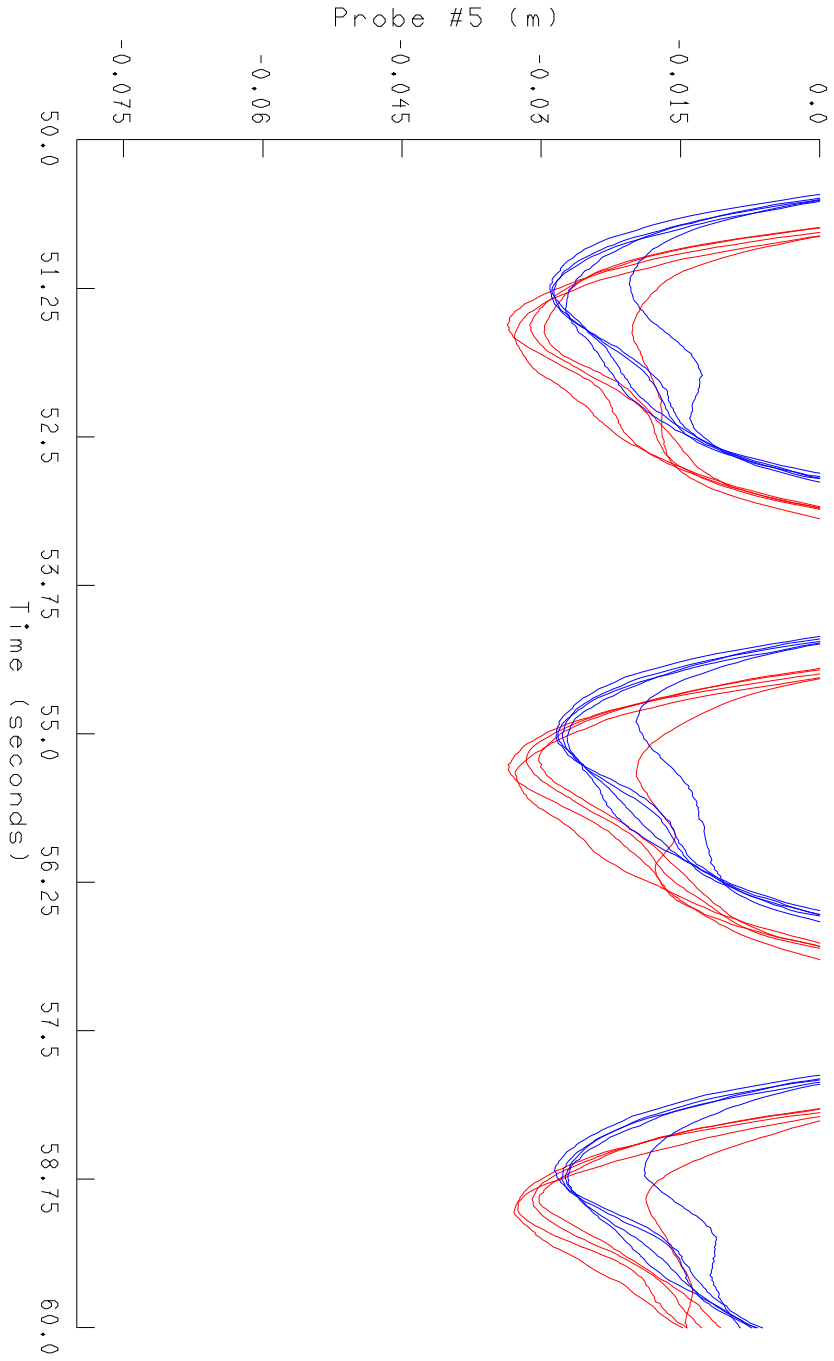

Fig. 10e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M5-4 : REGP5_H0P08_T3P704

before after

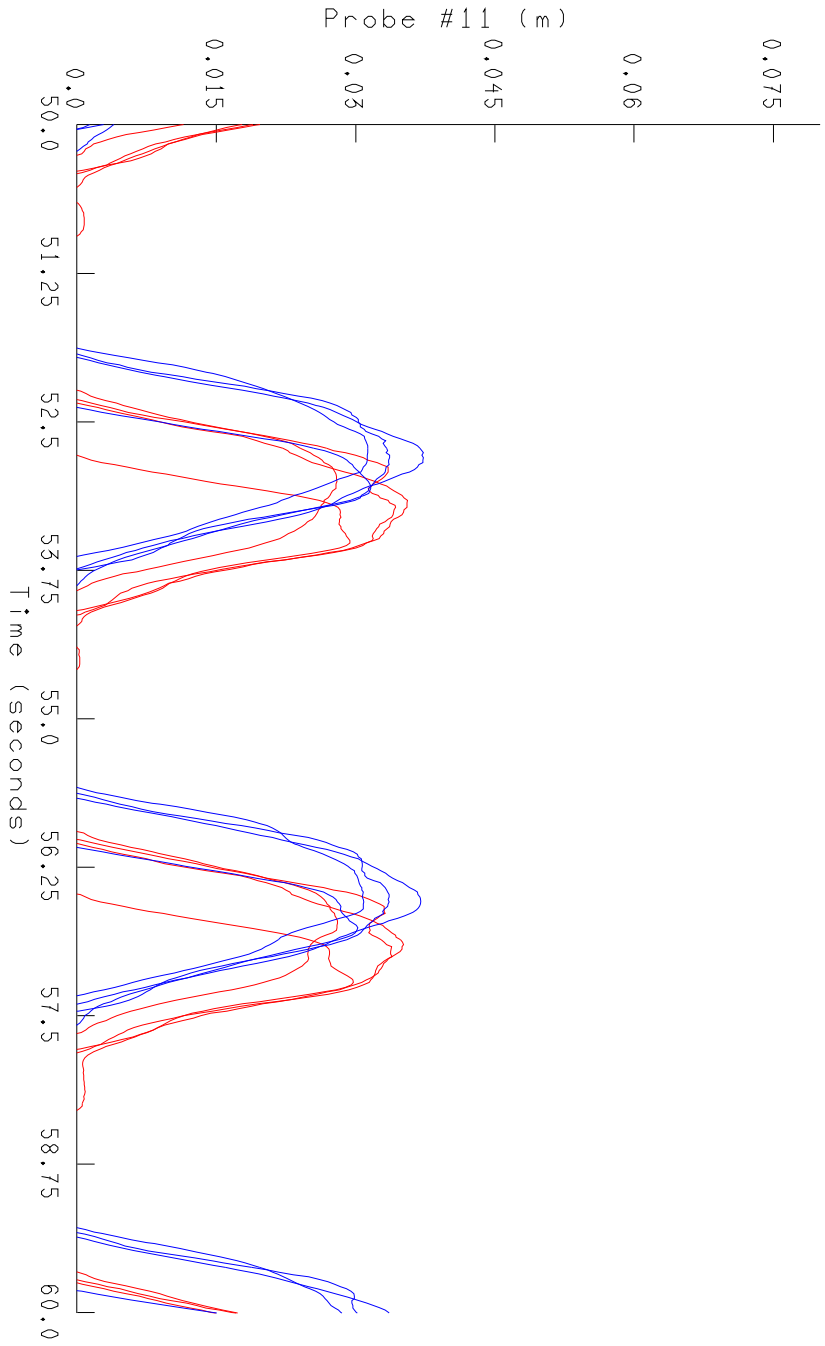

Fig. 10f: Surface elevations at Probes: 11-12-13-14 (Crest)
M5-4 : REGP5_H0P08_T3P704

before after

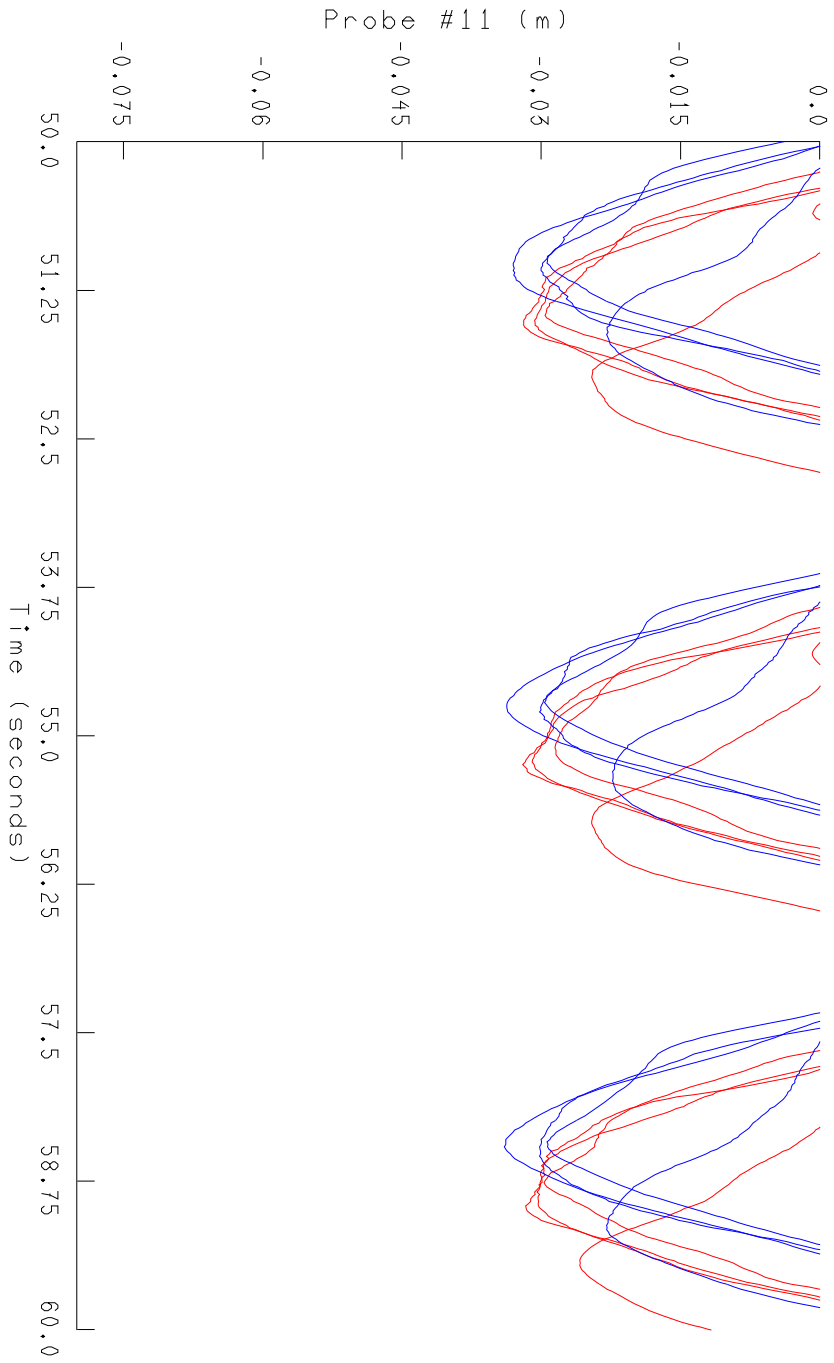

Fig. 10g: Surface elevations at Probes: 11-12-13-14 (Trough)
M5-4 : REGP5_H0P08_T3P704

before after

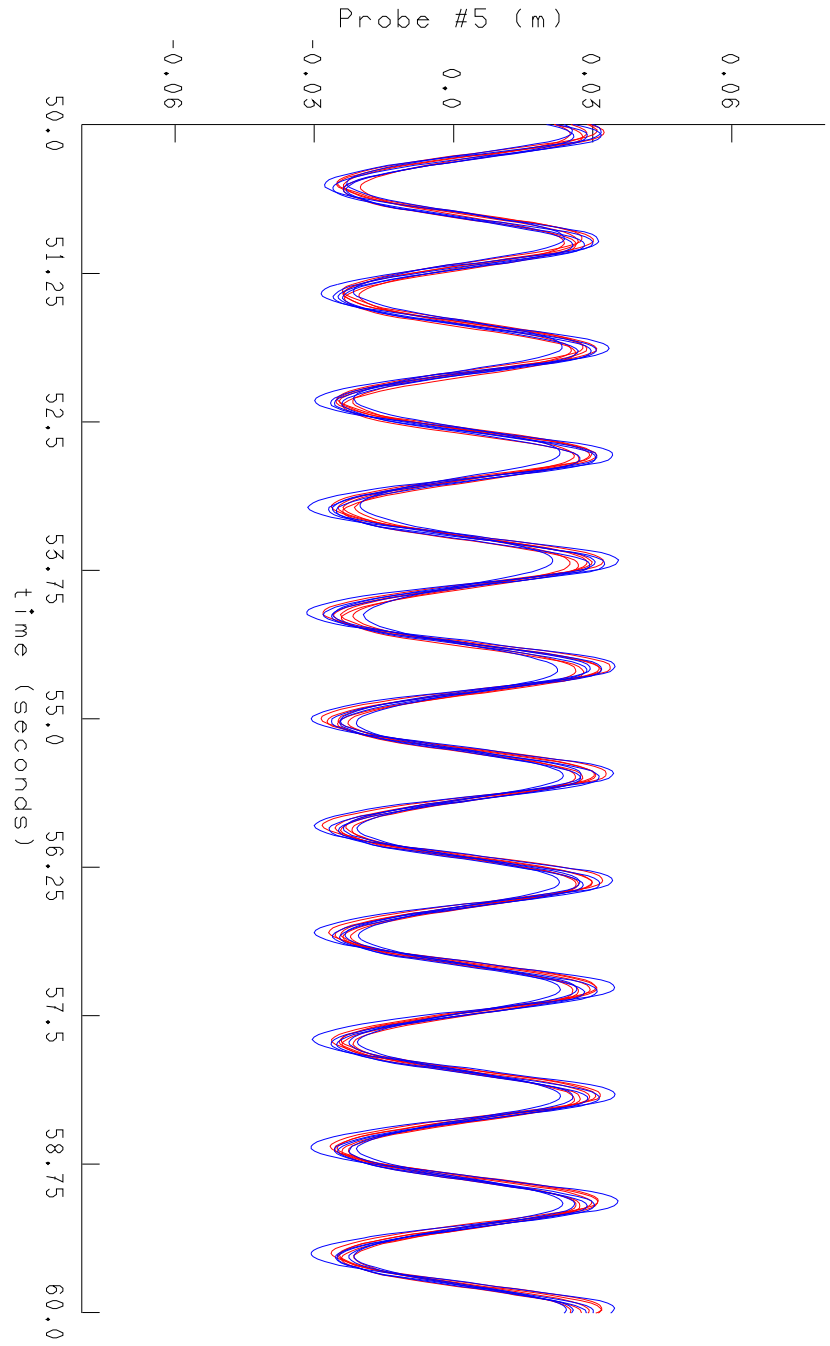

Fig. 11a: Surface elevations at Probes: 5-4-3-6-7
M6-1 : REGP6_H0P06_T0P9

before after

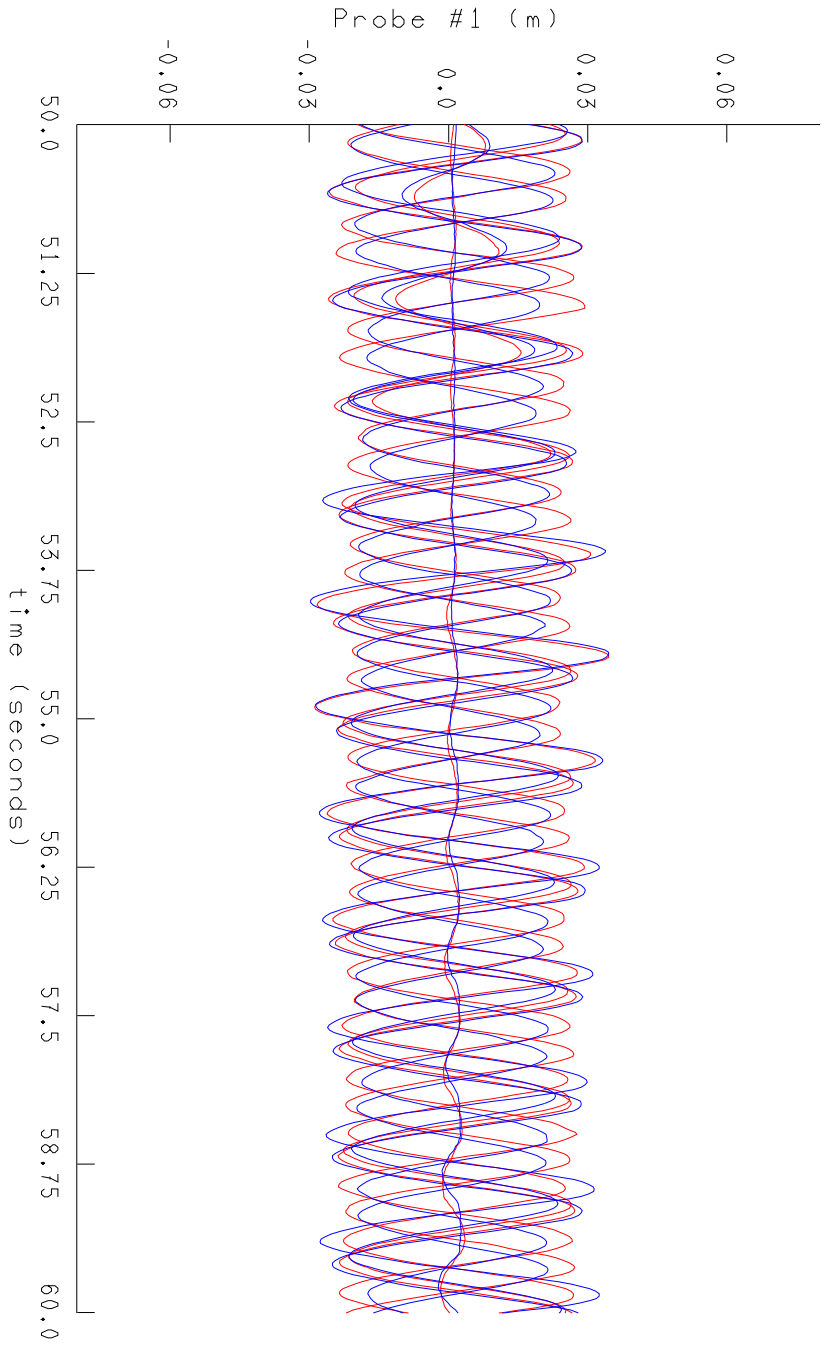

Fig. 11b: Surface elevations at Probes: 1-2-3-8-9-10
M6-1 : REGP6_H0P06_T0P9

before after

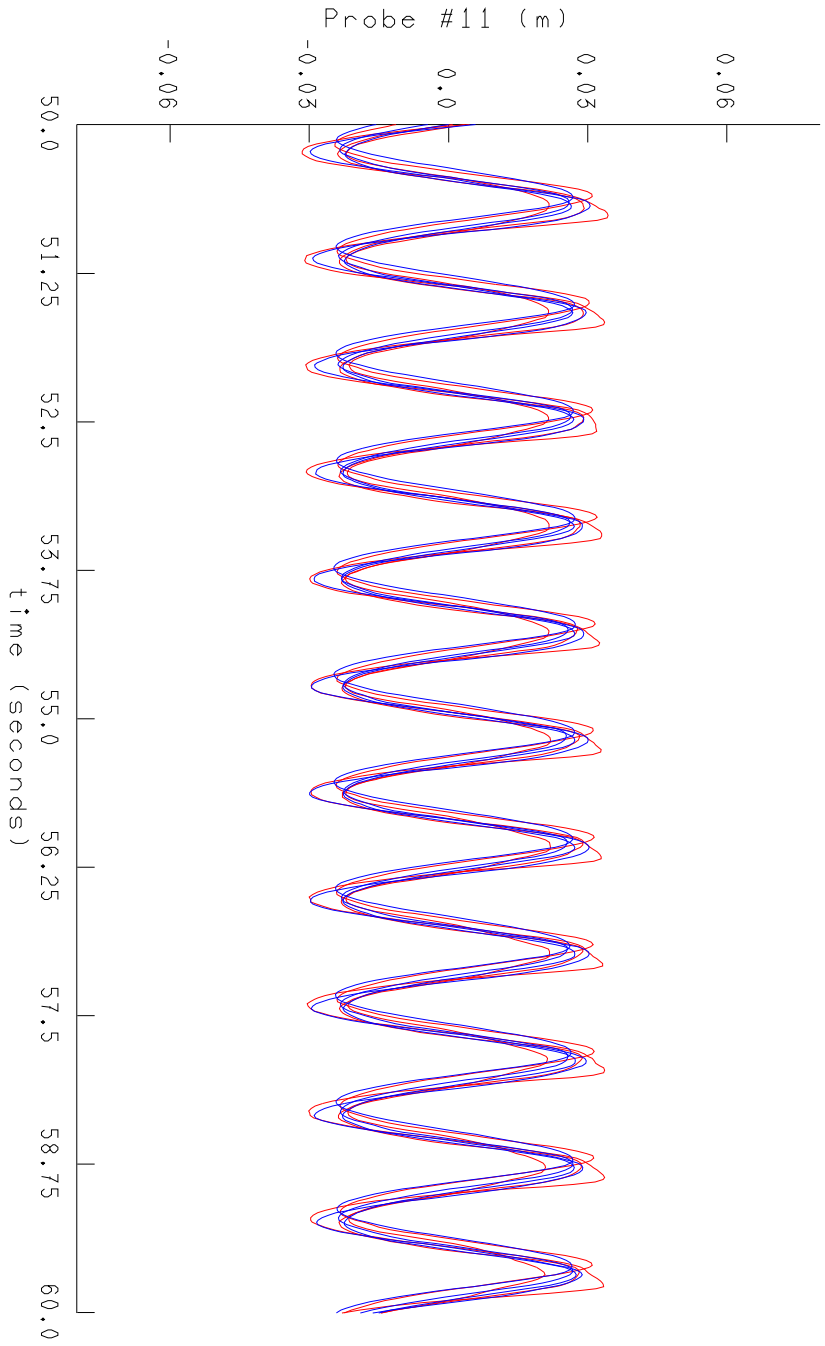

Fig. 11c: Surface elevations at Probes: 11-12-13-14
M6-1 : REGP6_H0P06_T0P9

before after

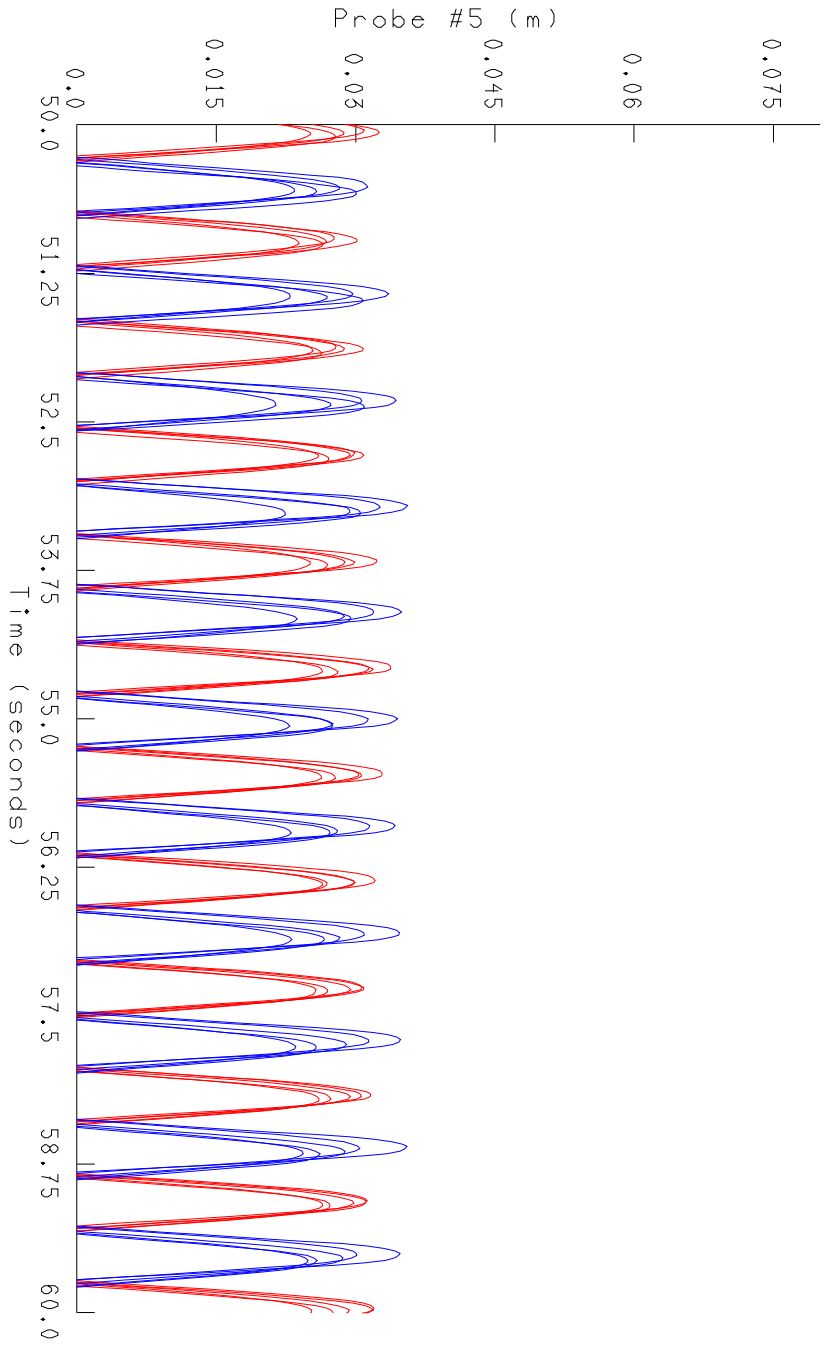

Fig. 11d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M6-1 : REGP6_H0P06_T0P9

before after

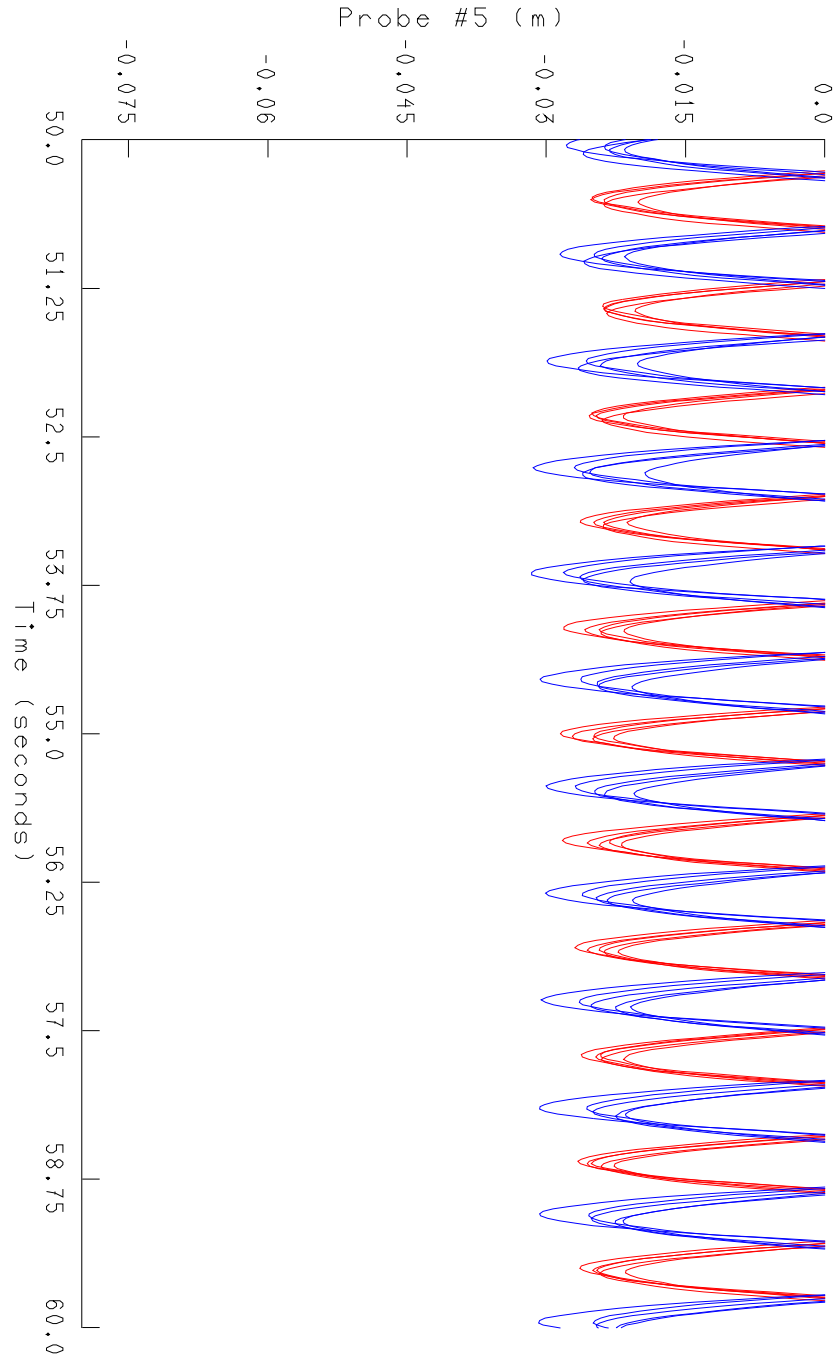

Fig. 11e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M6-1 : REGP6_H0P06_T0P9

before after

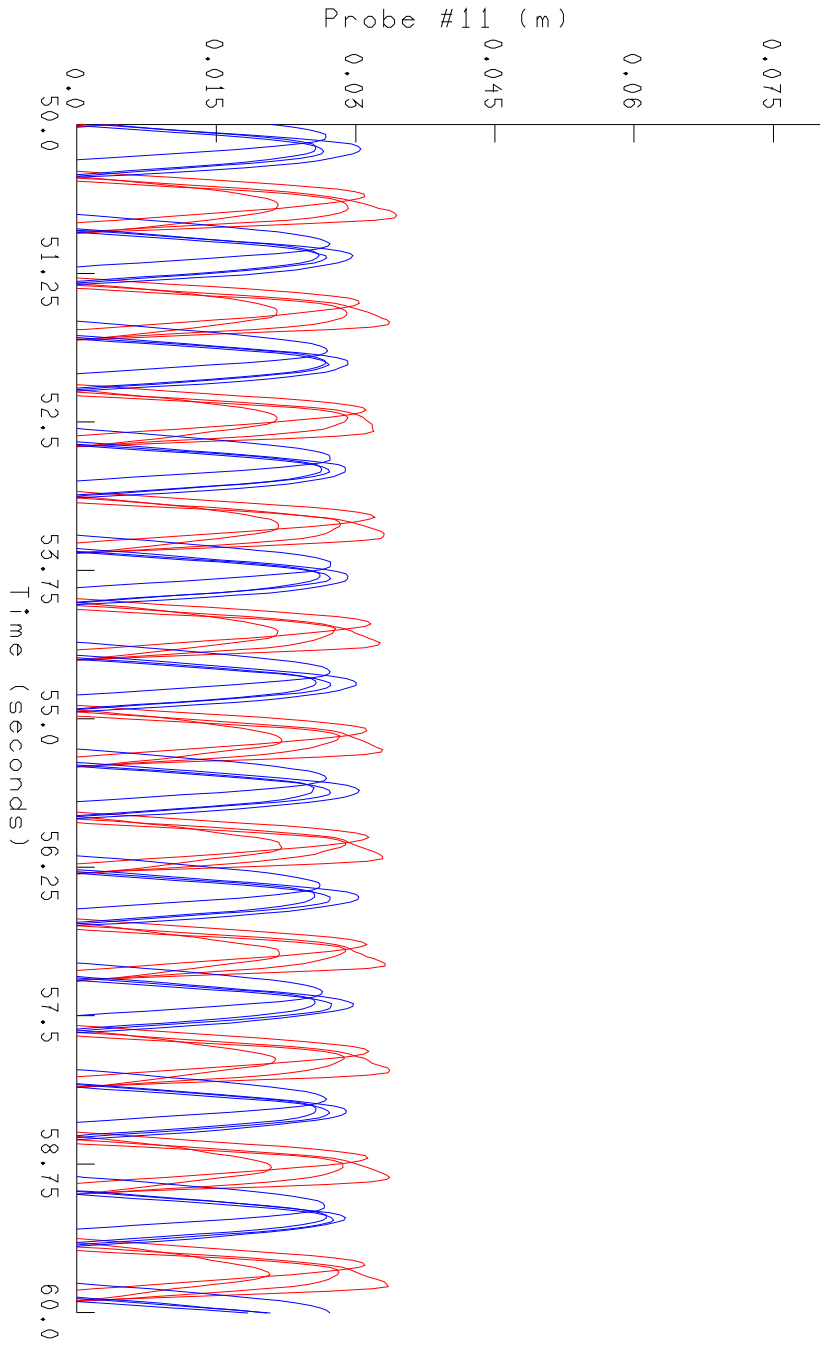

Fig. 11f: Surface elevations at Probes: 11-12-13-14 (Crest)
M6-1 : REGP6_H0P06_T0P9

before after

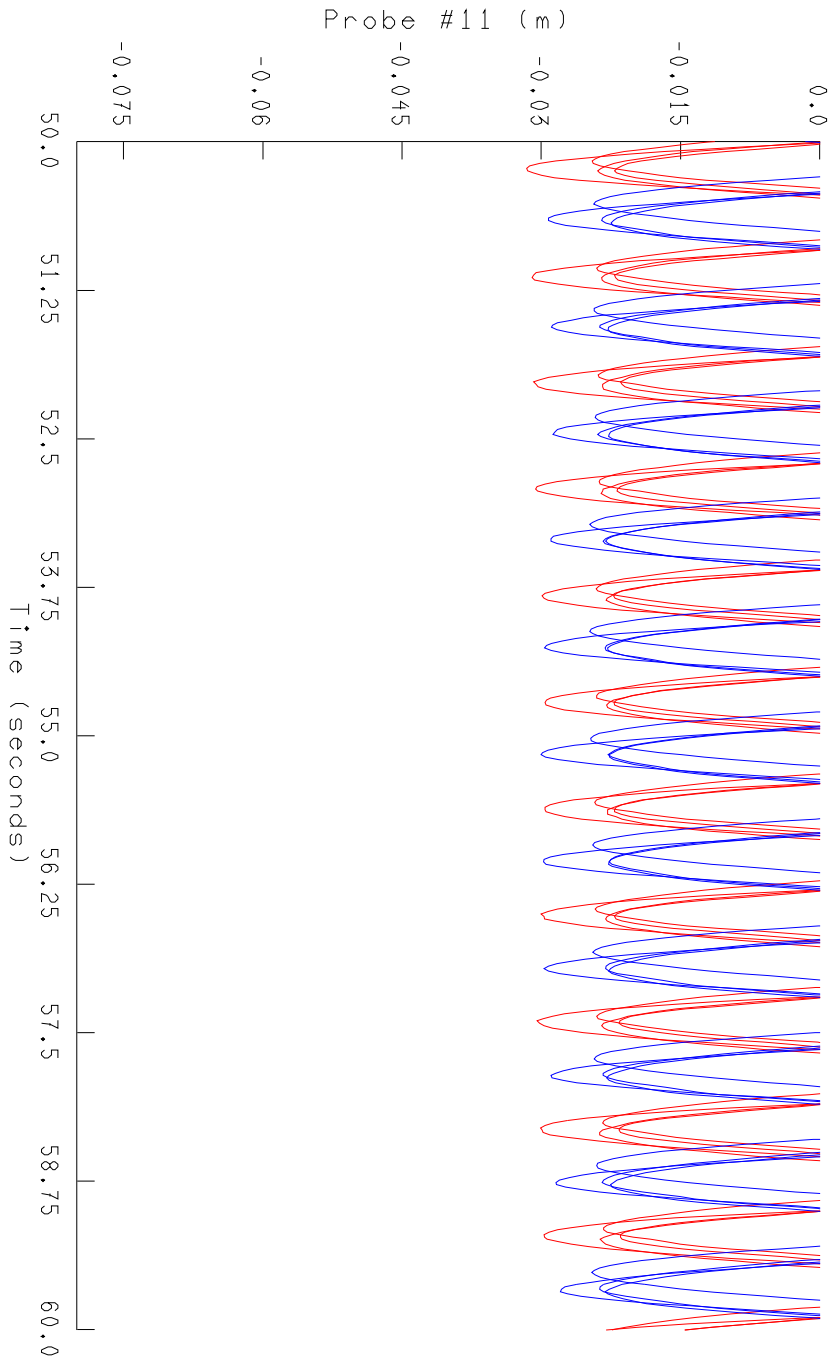

Fig. 11g: Surface elevations at Probes: 11-12-13-14 (Trough)
M6-1 : REGP6_H0P06_T0P9

before after

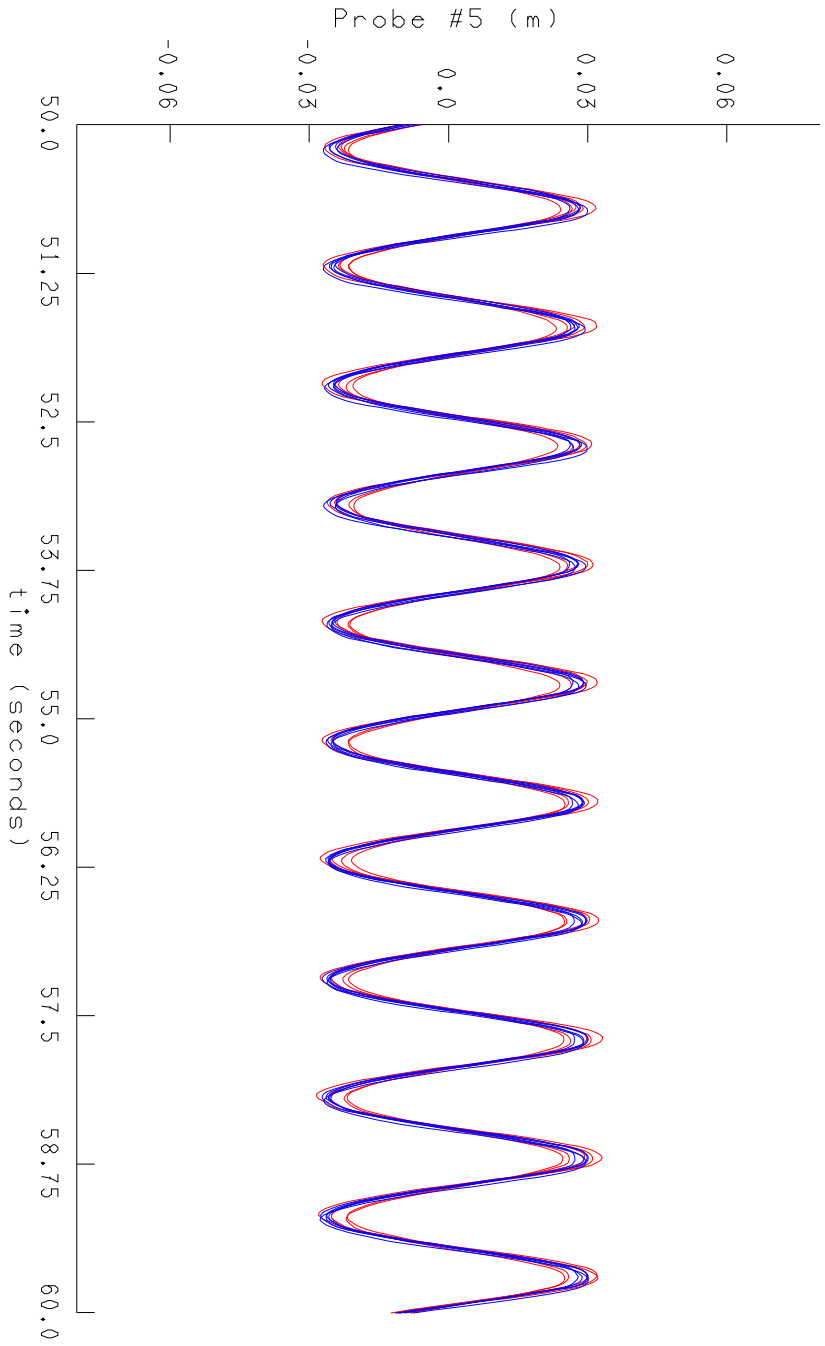

Fig. 12a: Surface elevations at Probes: 5-4-3-6-7
M6-1 : REGP6_H0P06_T1P0

before after

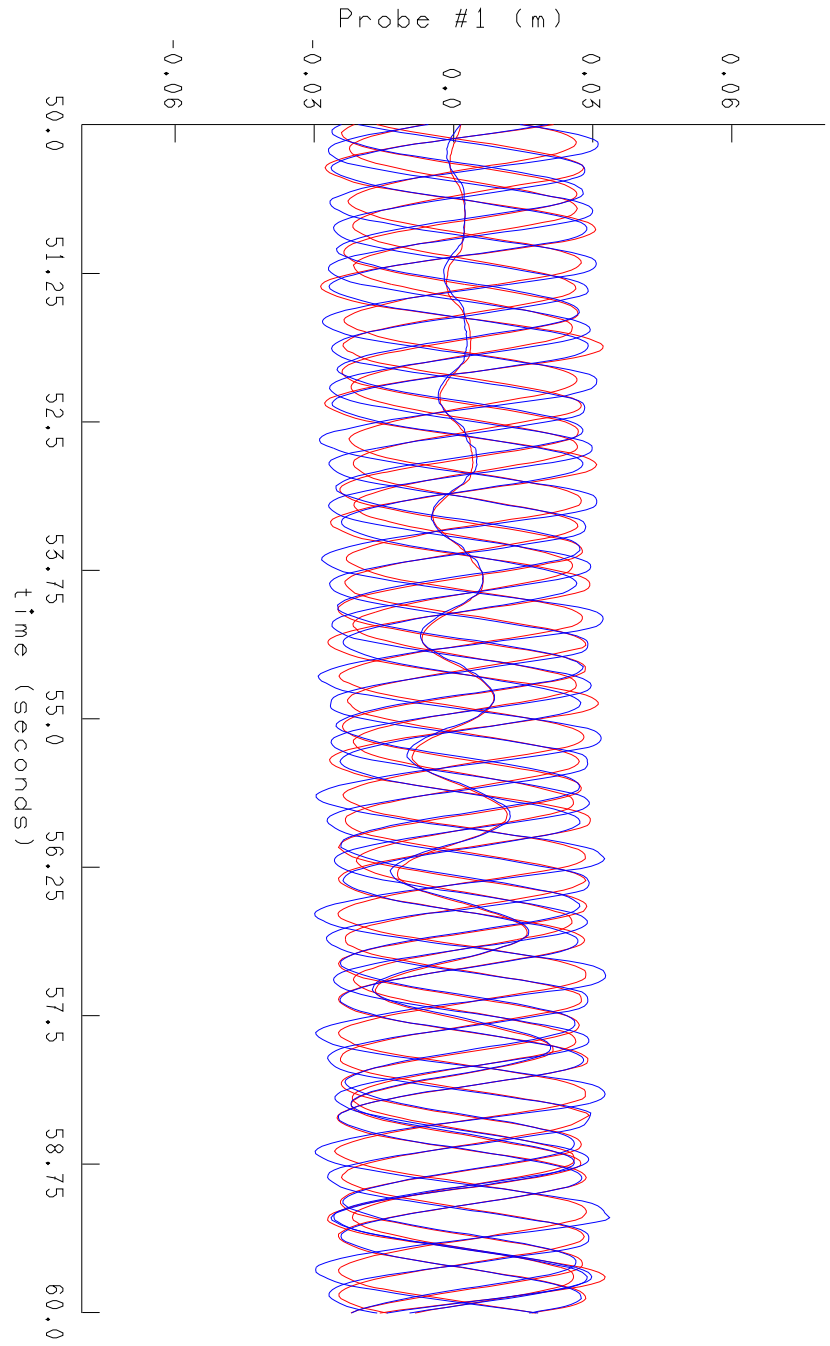

Fig. 12b: Surface elevations at Probes: 1-2-3-8-9-10
M6-1 : REGP6_H0P06_T1P0

before after

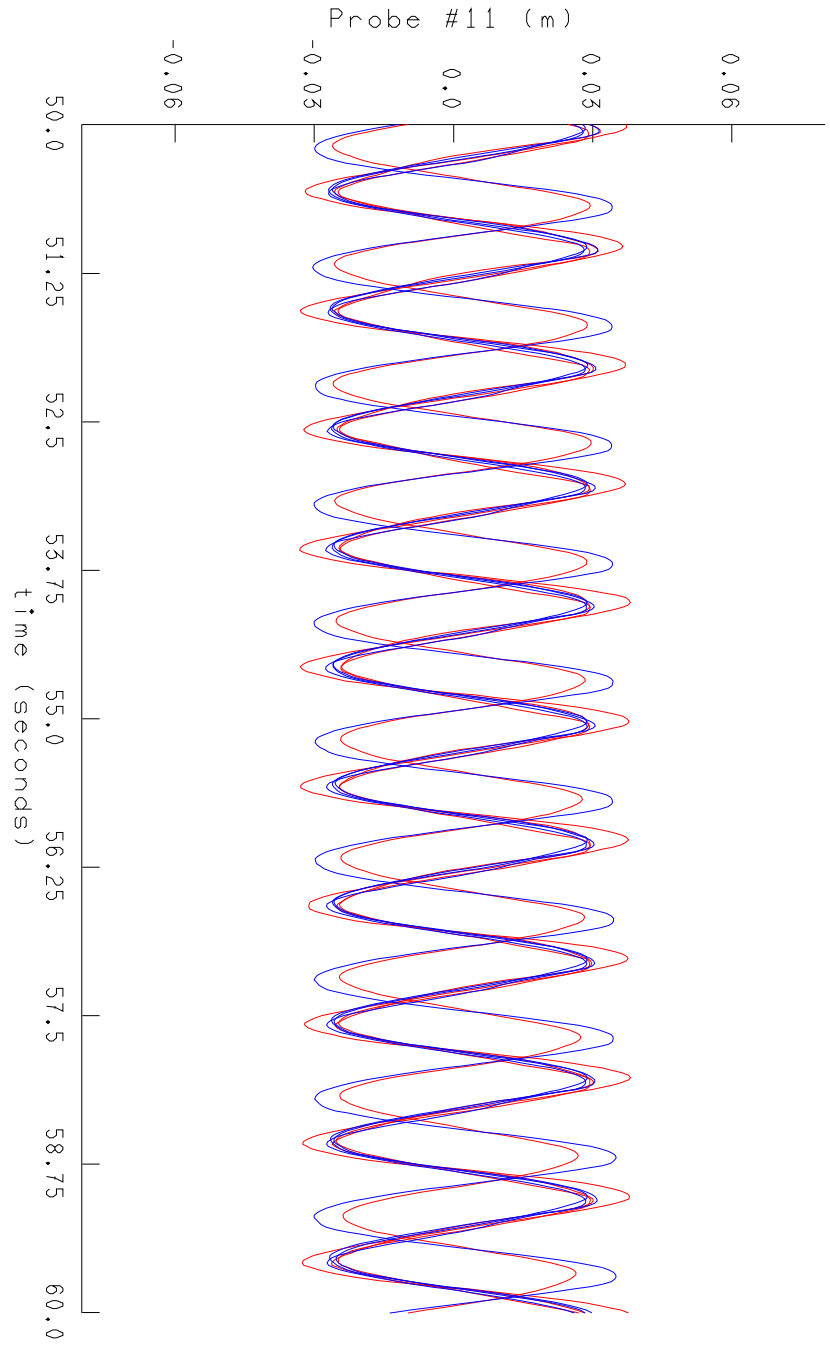

Fig. 12c: Surface elevations at Probes: 11-12-13-14
M6-1 : REGP6_H0P06_T1P0

before after

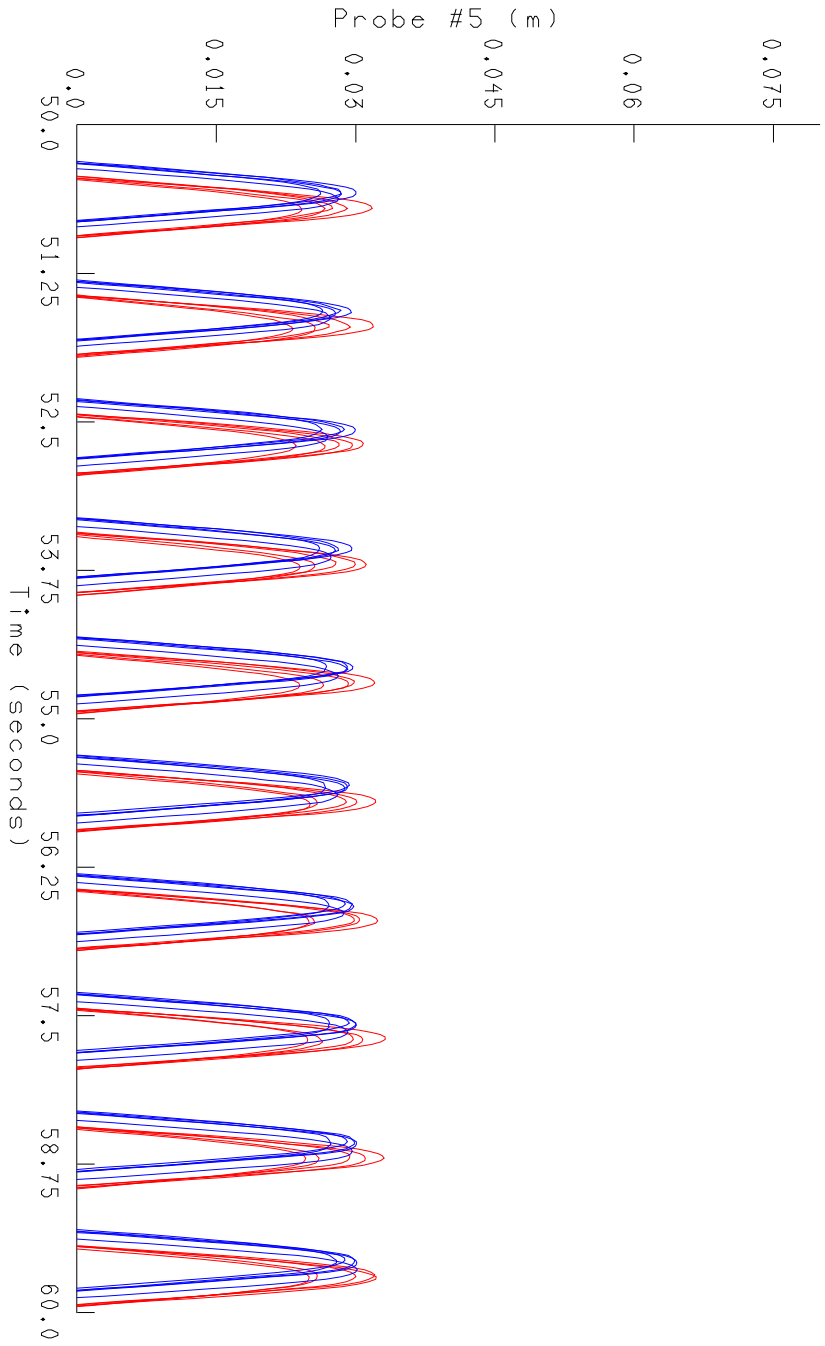

Fig. 12d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M6-1 : REGP6_H0P06_T1P0

before after

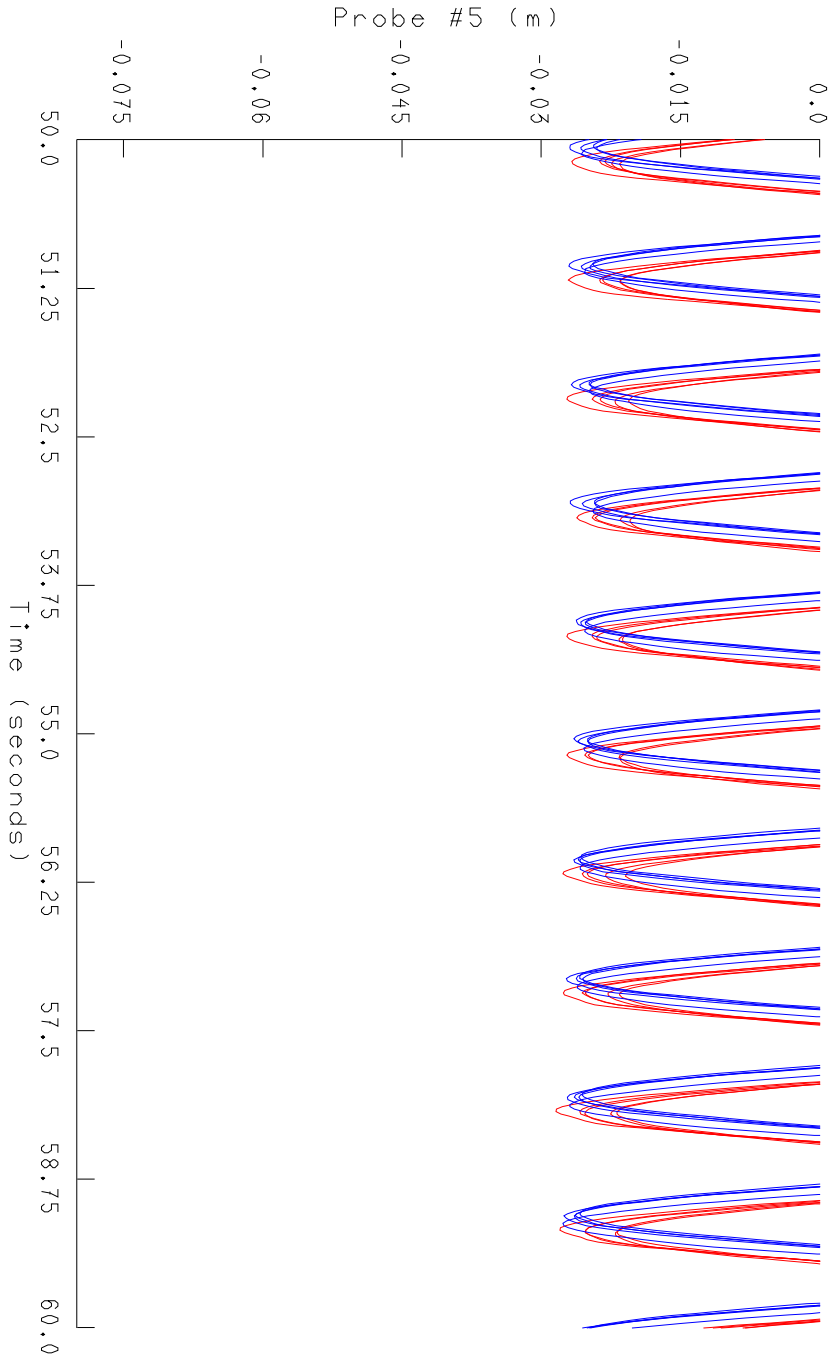

Fig. 12e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M6-1 : REGP6_H0P06_T1P0

before after

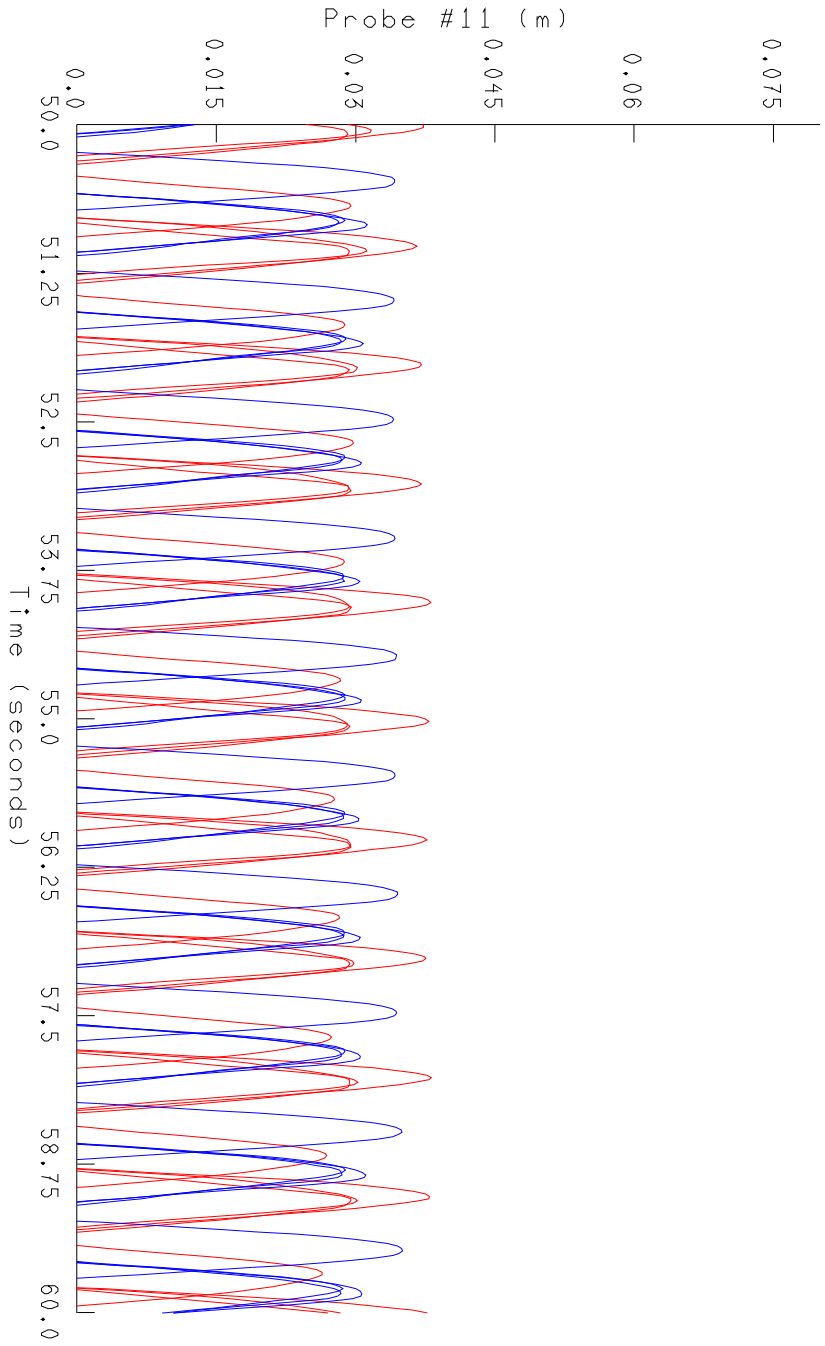

Fig. 12f: Surface elevations at Probes: 11-12-13-14 (Crest)
M6-1 : REGP6_H0P06_T1P0

before after

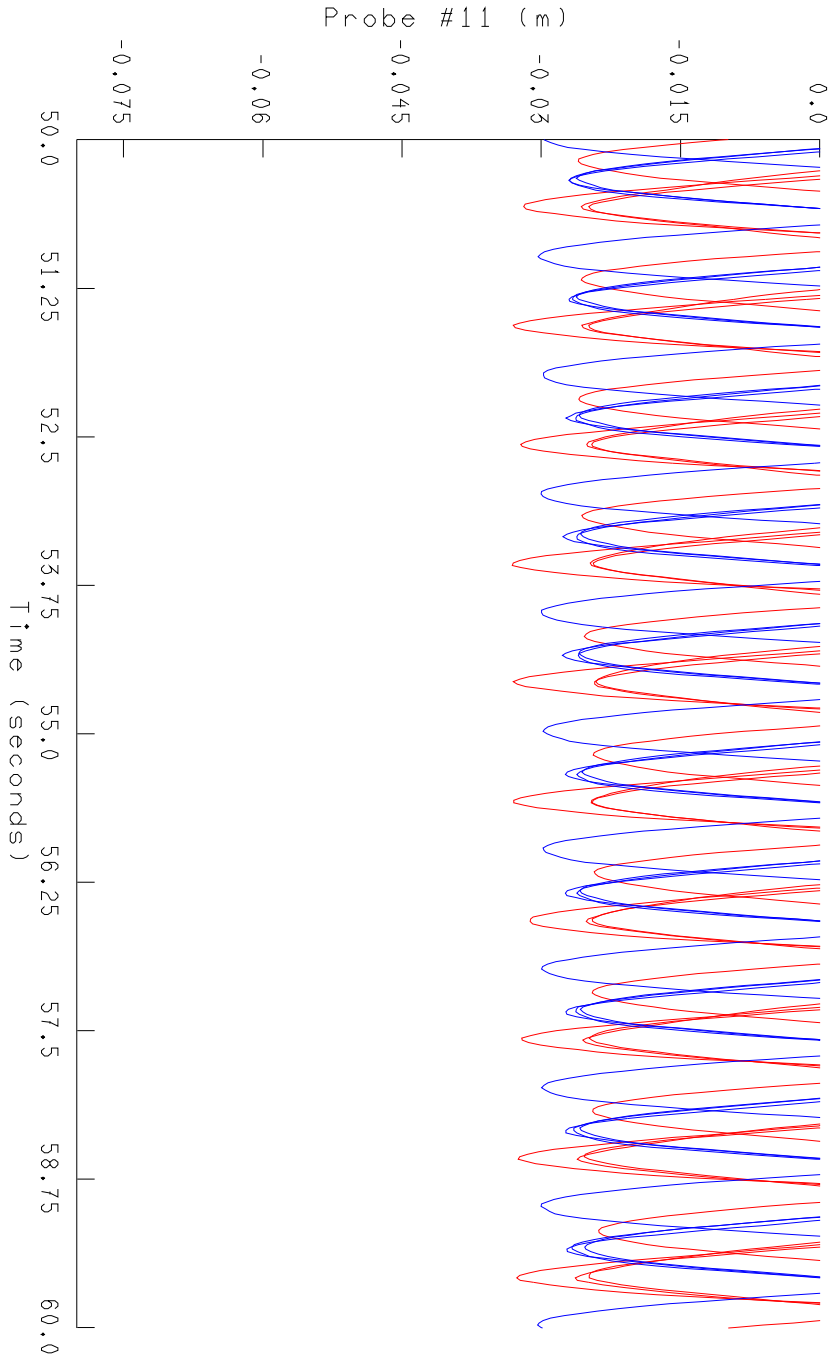

Fig. 12g: Surface elevations at Probes: 11-12-13-14 (Trough)
M6-1 : REGP6_H0P06_T1P0

before after

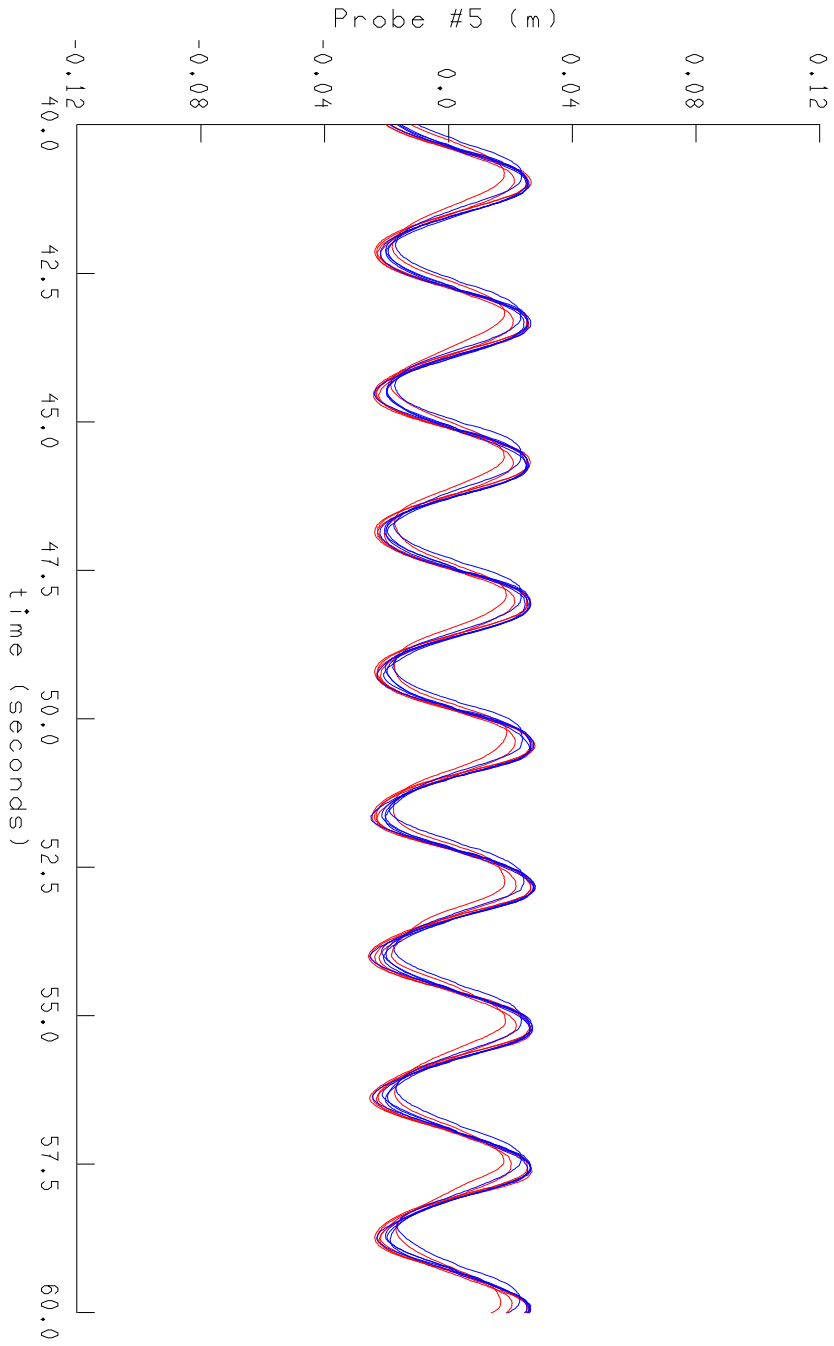

Fig. 13a: Surface elevations at Probes: 5-4-3-6-7
M8-1 : REGP8_H0P06_T2P370

before after

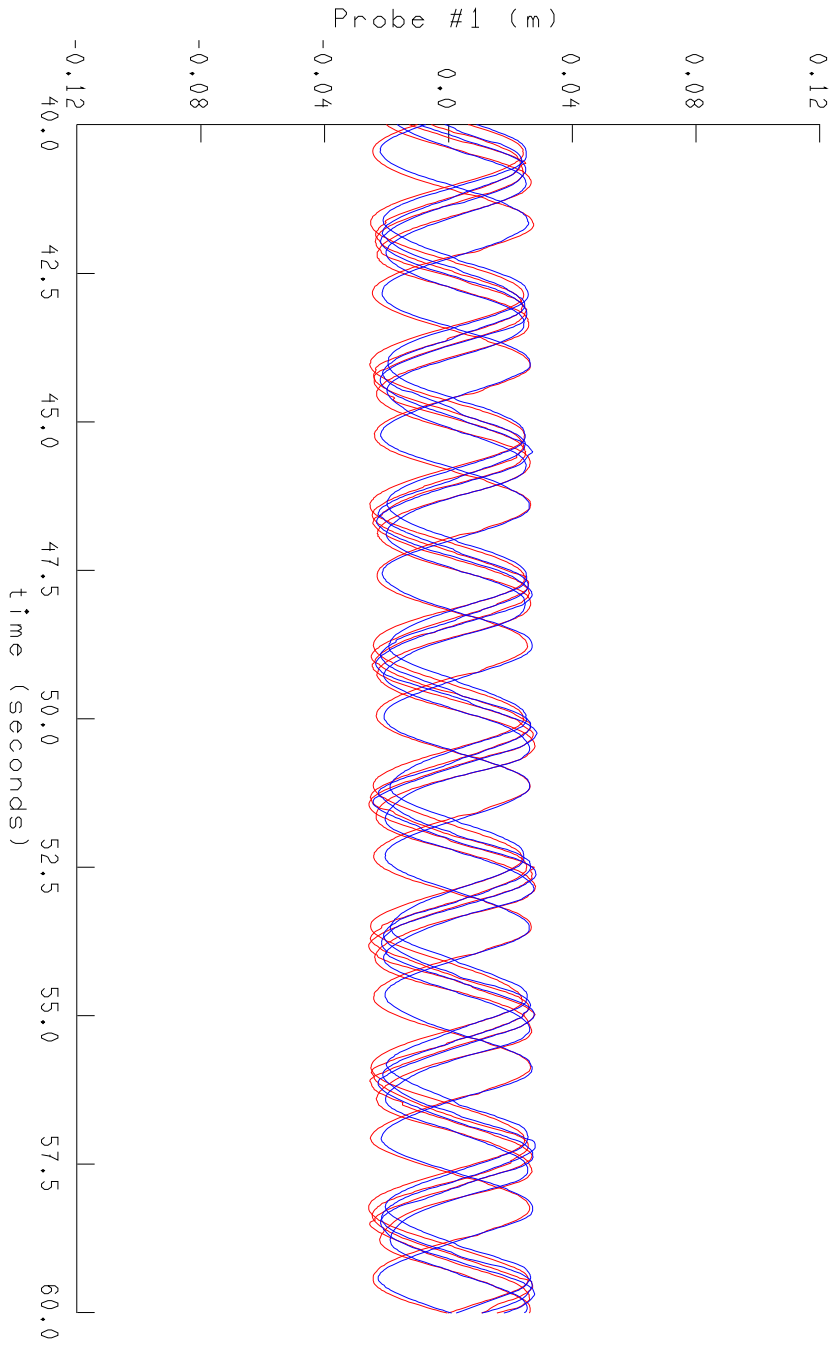

Fig. 13b: Surface elevations at Probes: 1-2-3-8-9
M8-1 : REGP8_H0P06_T2P370

before after

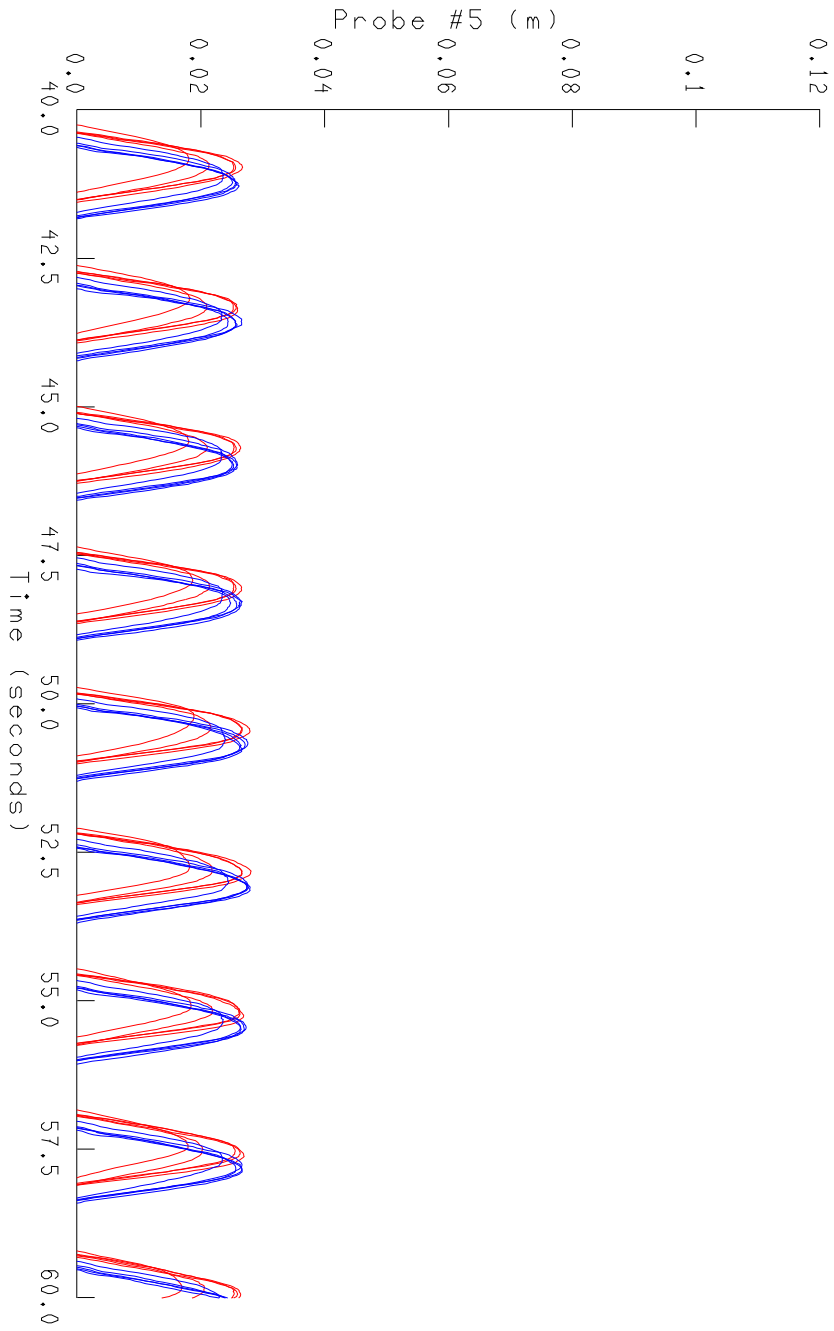

Fig. 13c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M8-1 : REGP8_H0P06_T2P370

before after

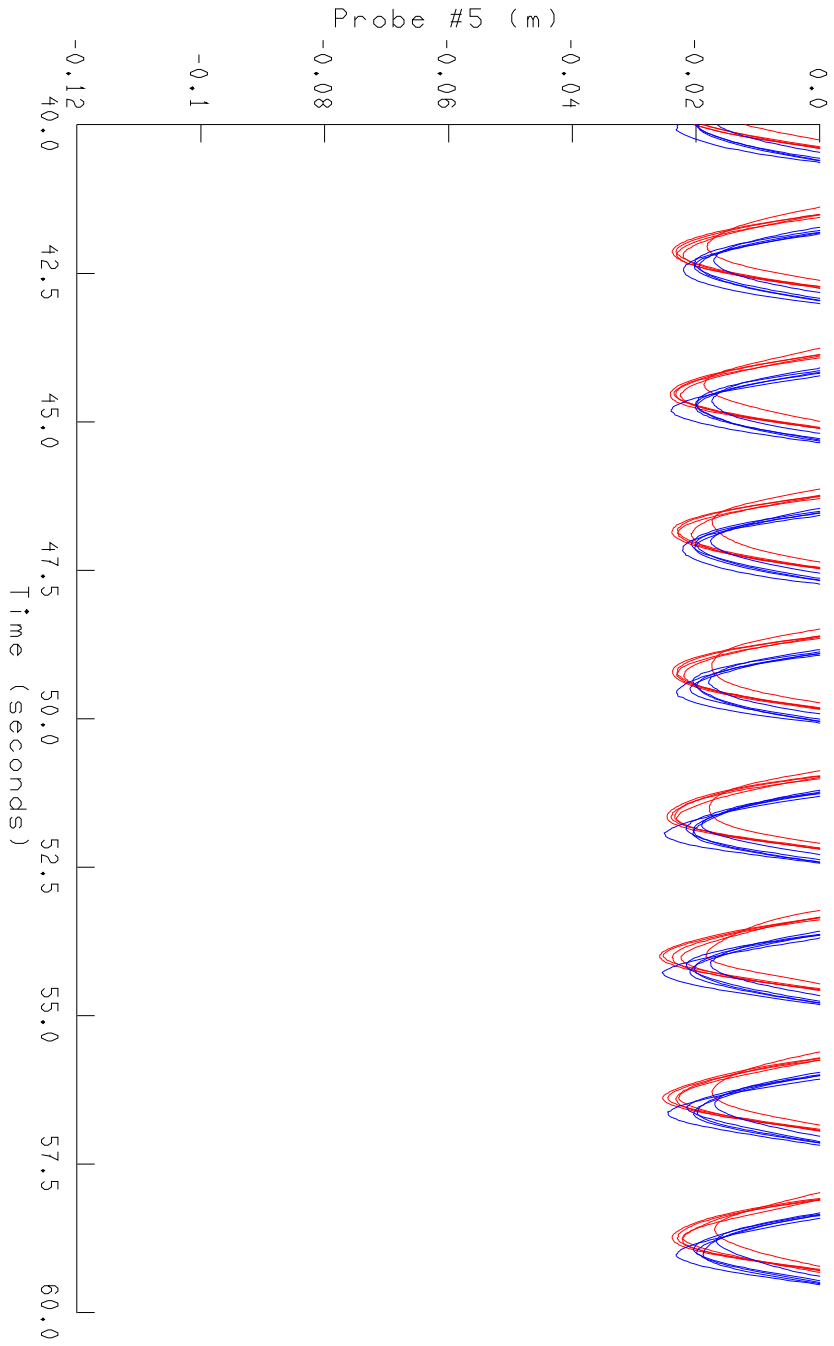

Fig. 13d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M8-1 : REGP8_H0P06_T2P370

before after

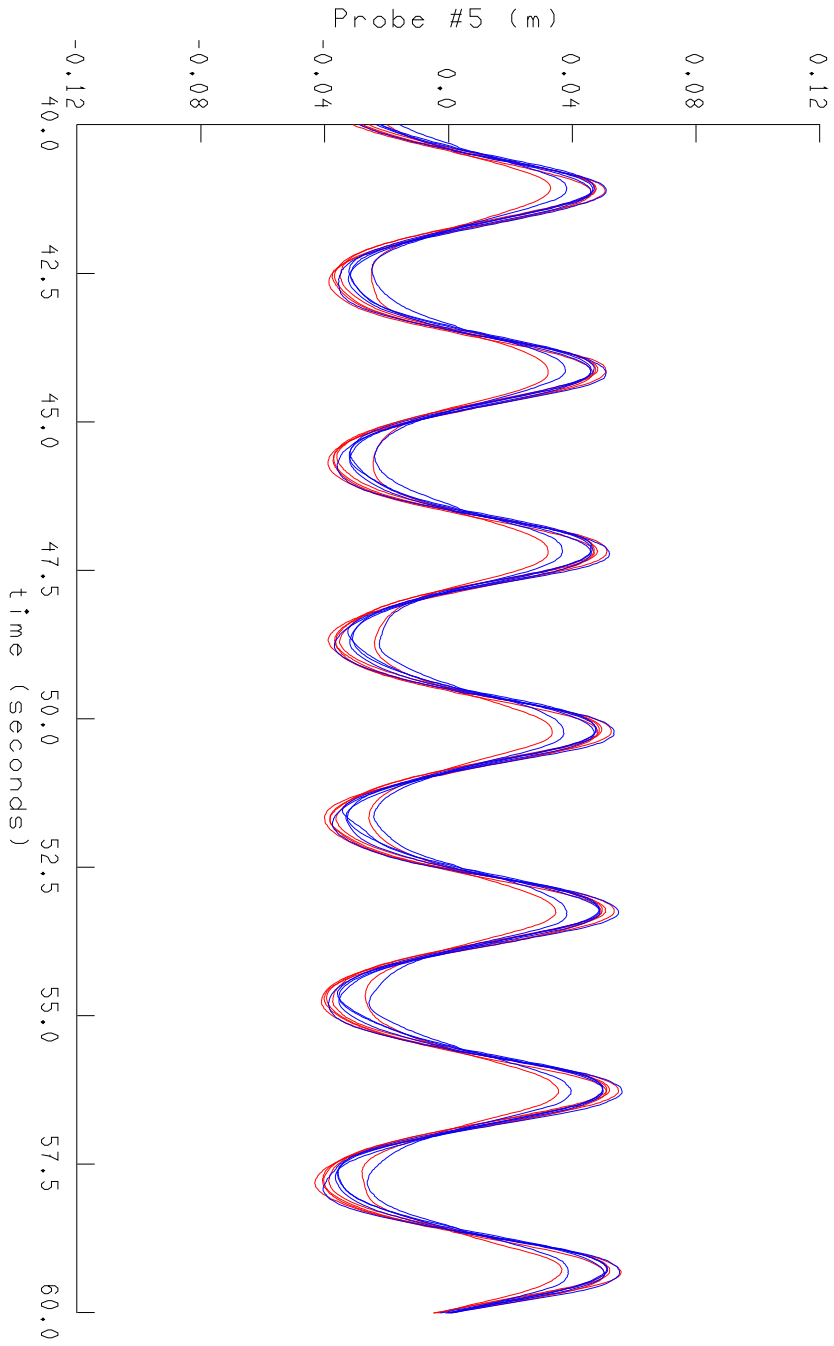

Fig. 14a: Surface elevations at Probes: 5-4-3-6-7
M8-2 : REGP8_H0P08_T3P035

before after

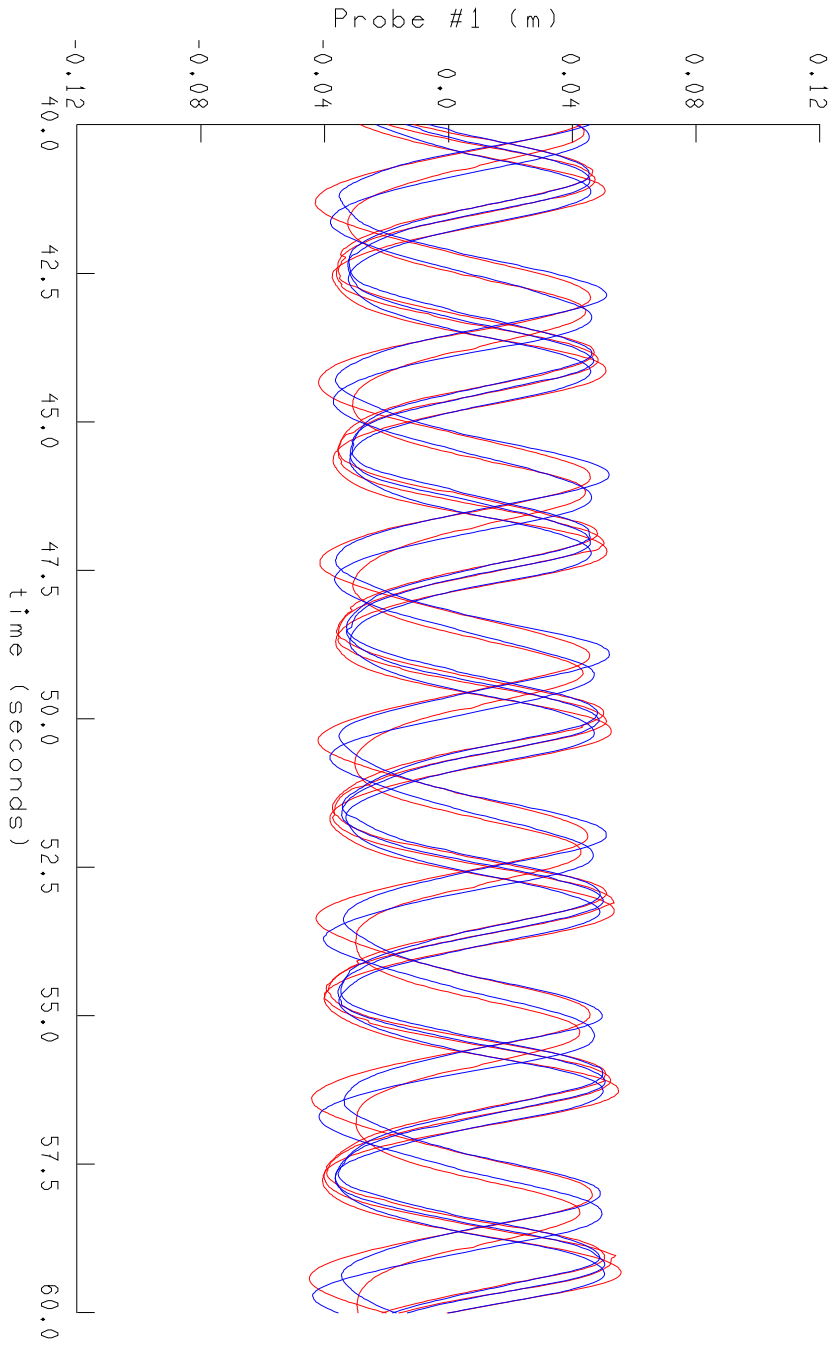

Fig. 14b: Surface elevations at Probes: 1-2-3-8-9
M8-2 : REGP8_H0P08_T3P035

before after

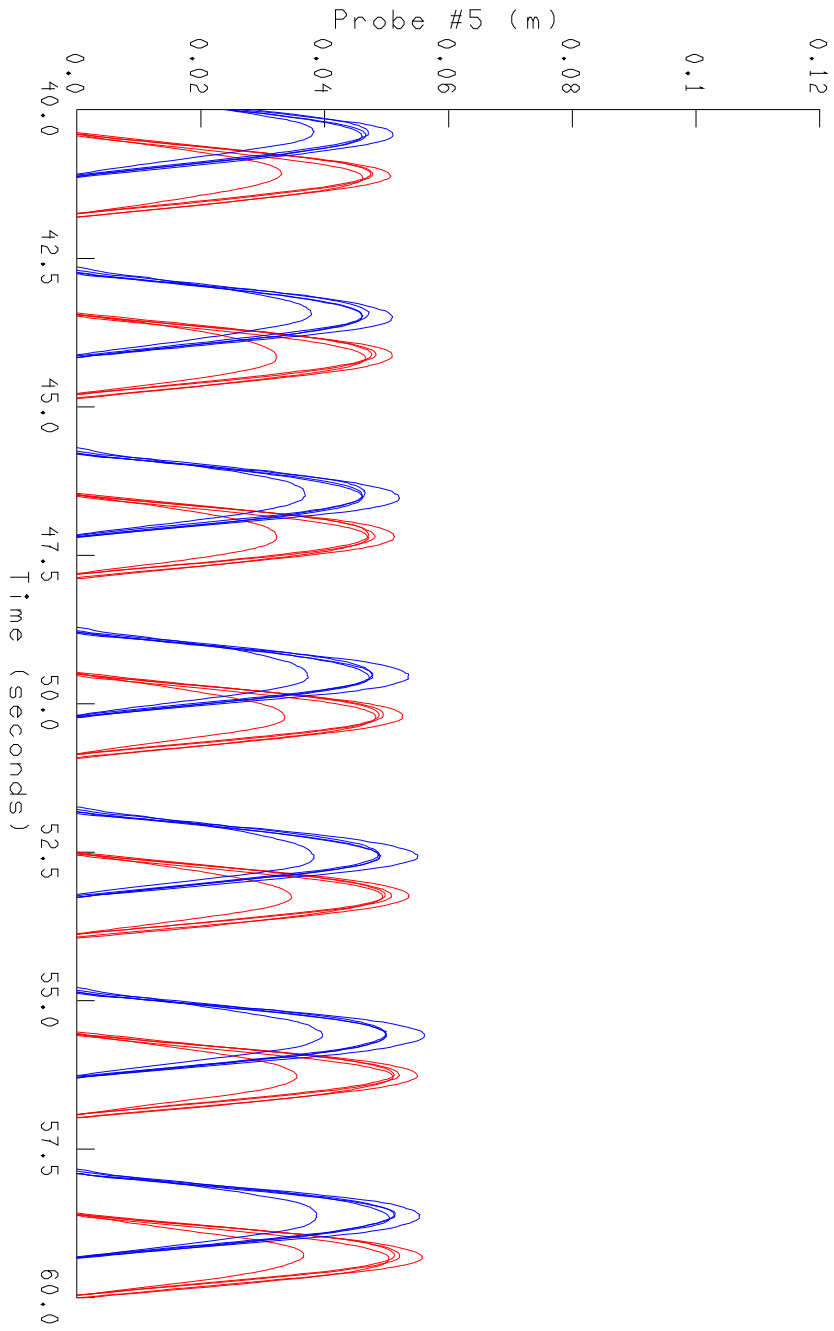

Fig. 14c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M8-2 : REGP8_H0P08_T3P035

before after

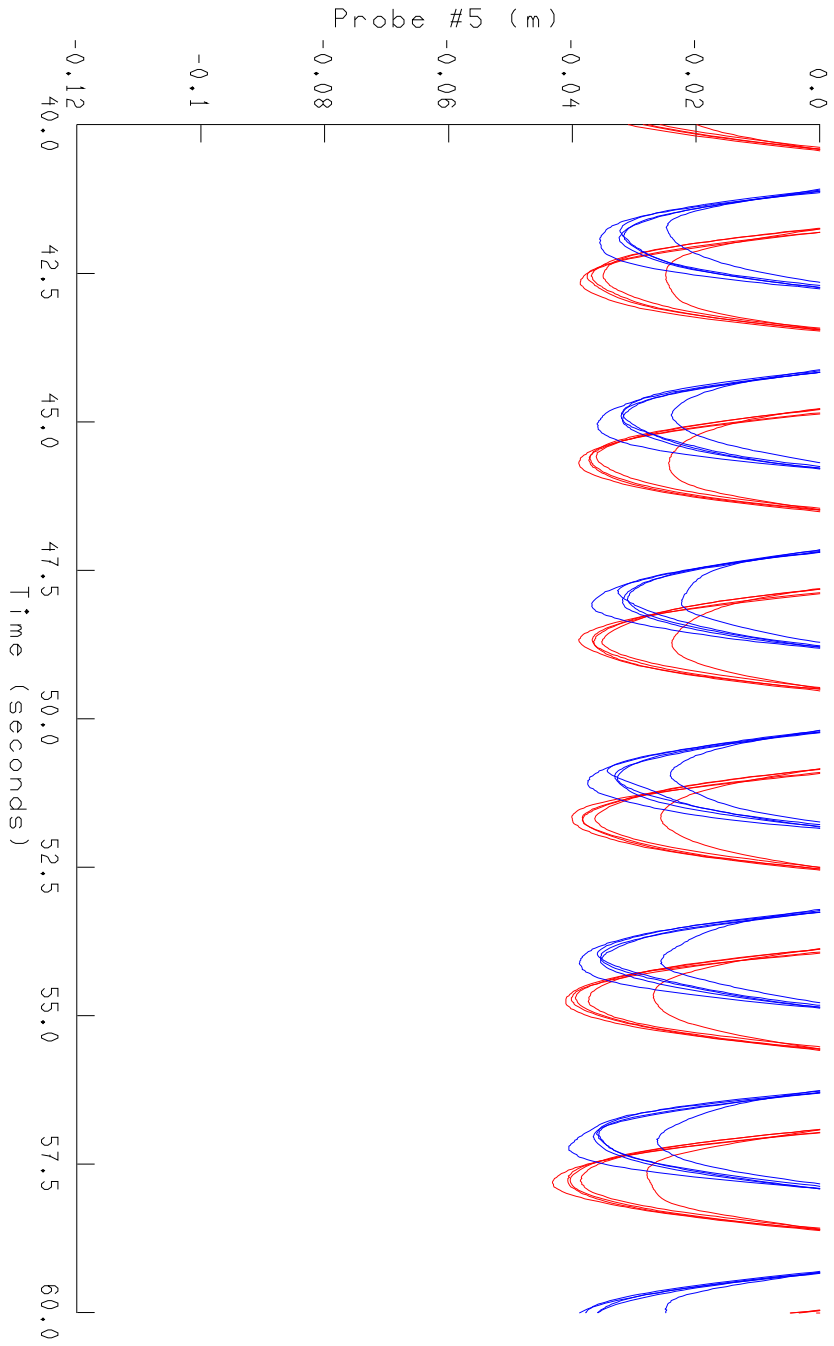

Fig. 14d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M8-2 : REGP8_H0P08_T3P035

before after

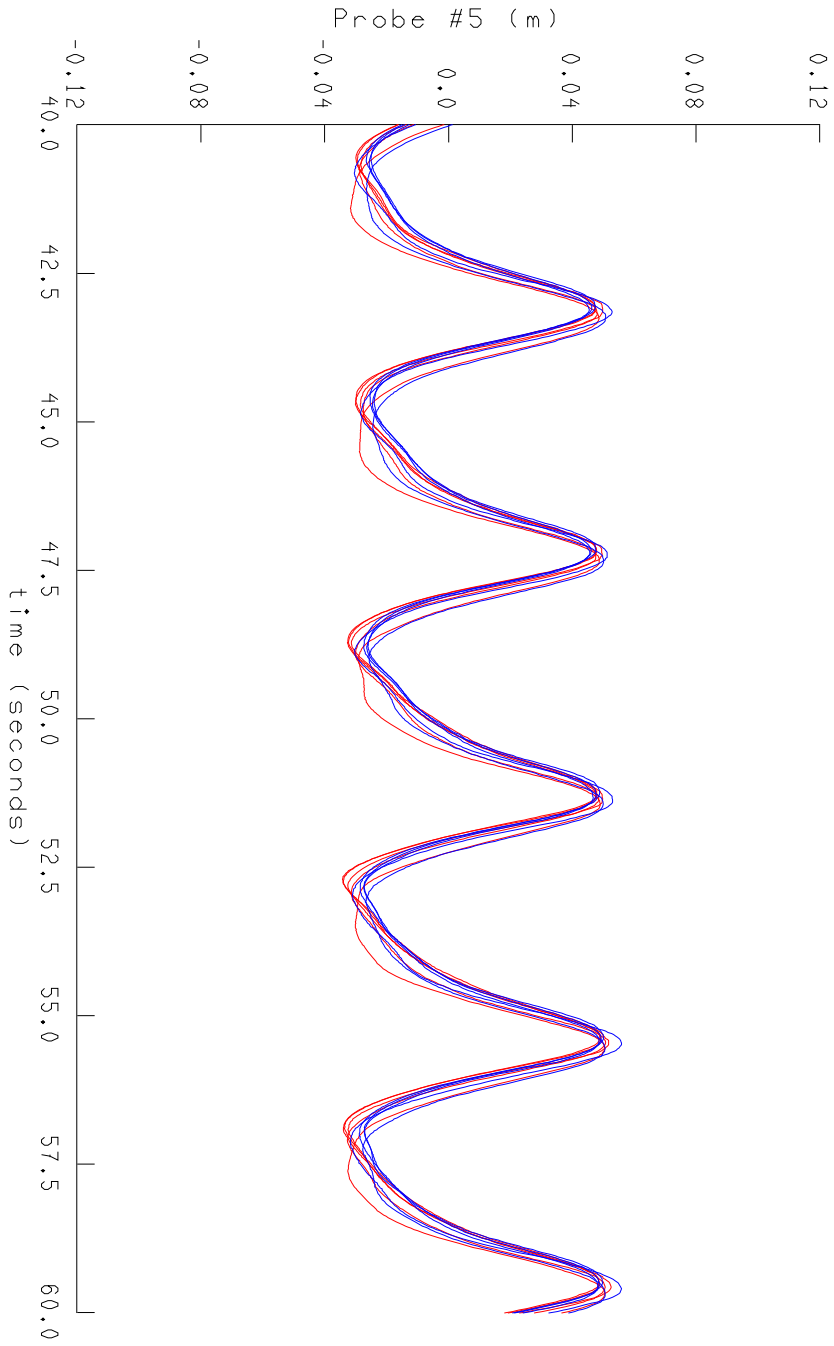

Fig. 15a: Surface elevations at Probes: 5-4-3-6-7
M8-3 : REGP8_H0P08_T4P105

before after

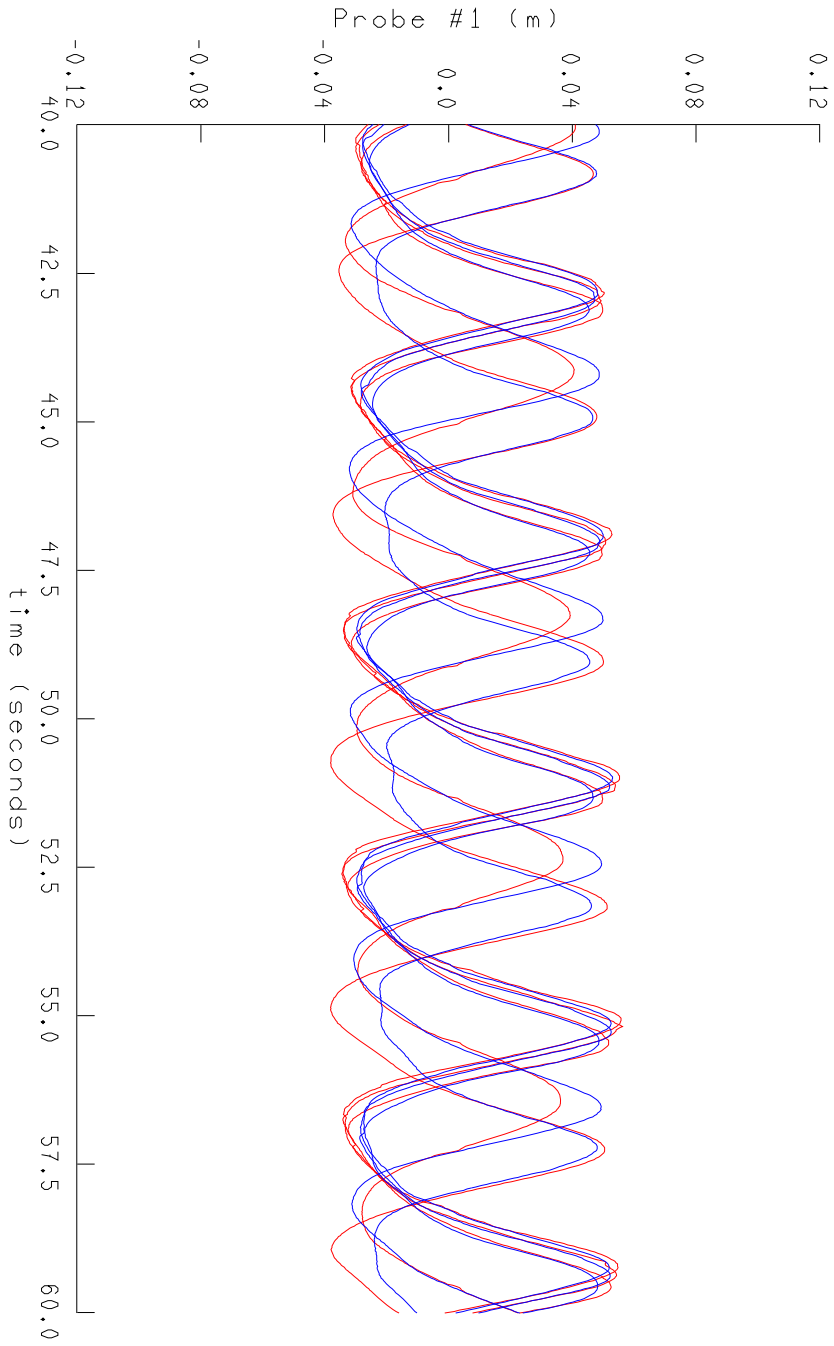

Fig. 15b: Surface elevations at Probes: 1-2-3-8-9
M8-3 : REGP8_H0P08_T4P105

before after

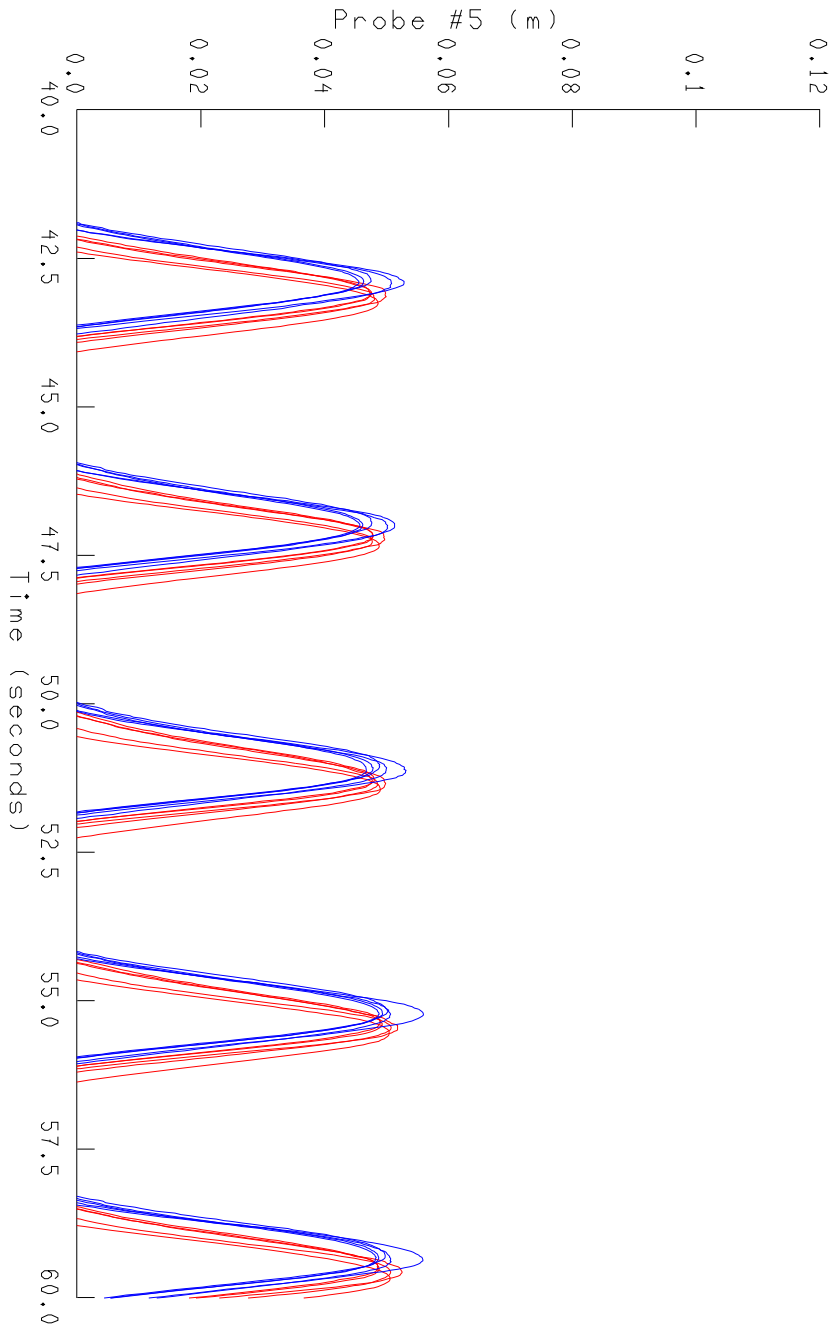

Fig. 15c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
M8-3 : REGP8_H0P08_T4P105

before after

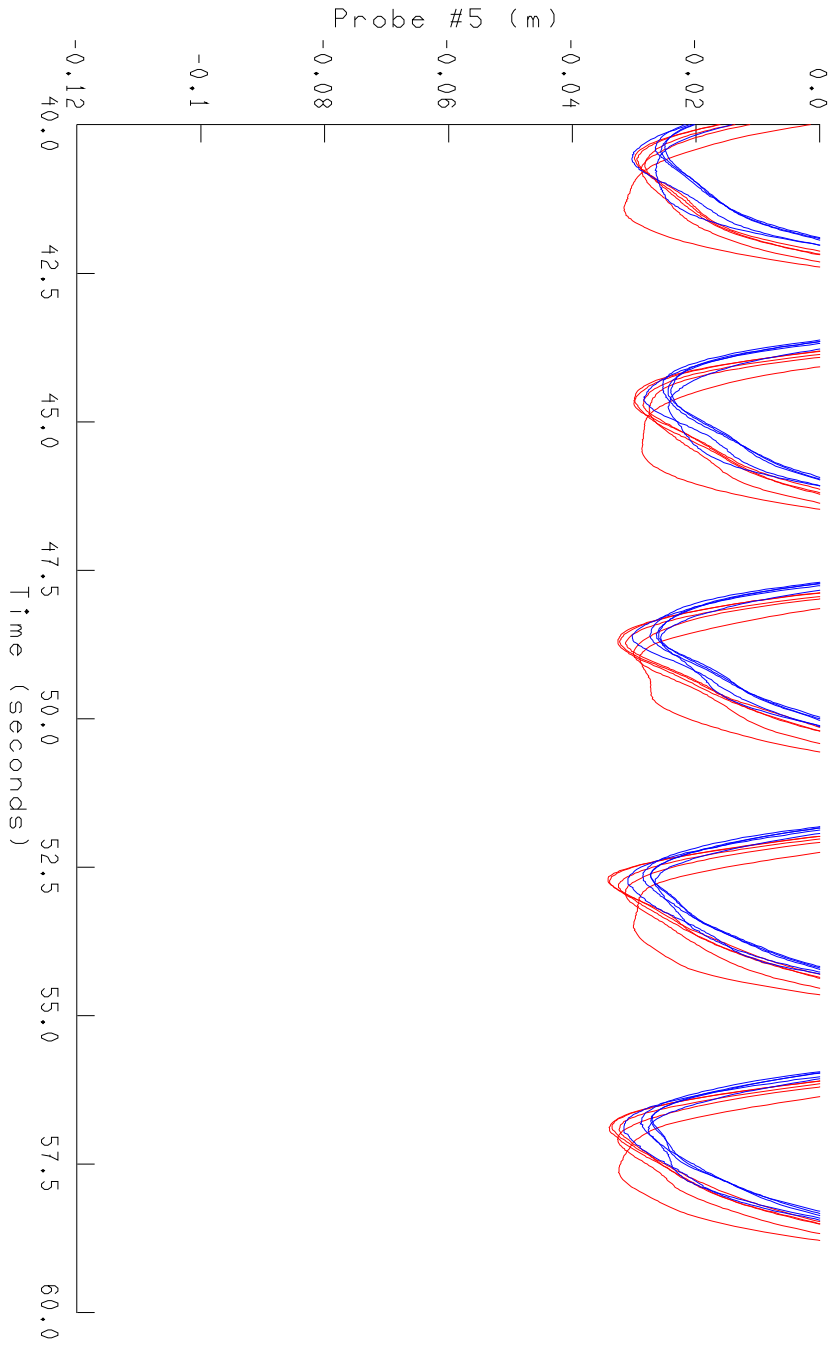

Fig. 15d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
M8-3 : REGP8_H0P08_T4P105

before after

APPENDIX – II

Surface elevations, wave crests and wave troughs for bi-chromatic waves

Probes array:

Probes: 5-4-3-6-7
Probes: 11-12-13-14
Probes 1-2-3-8-9-10

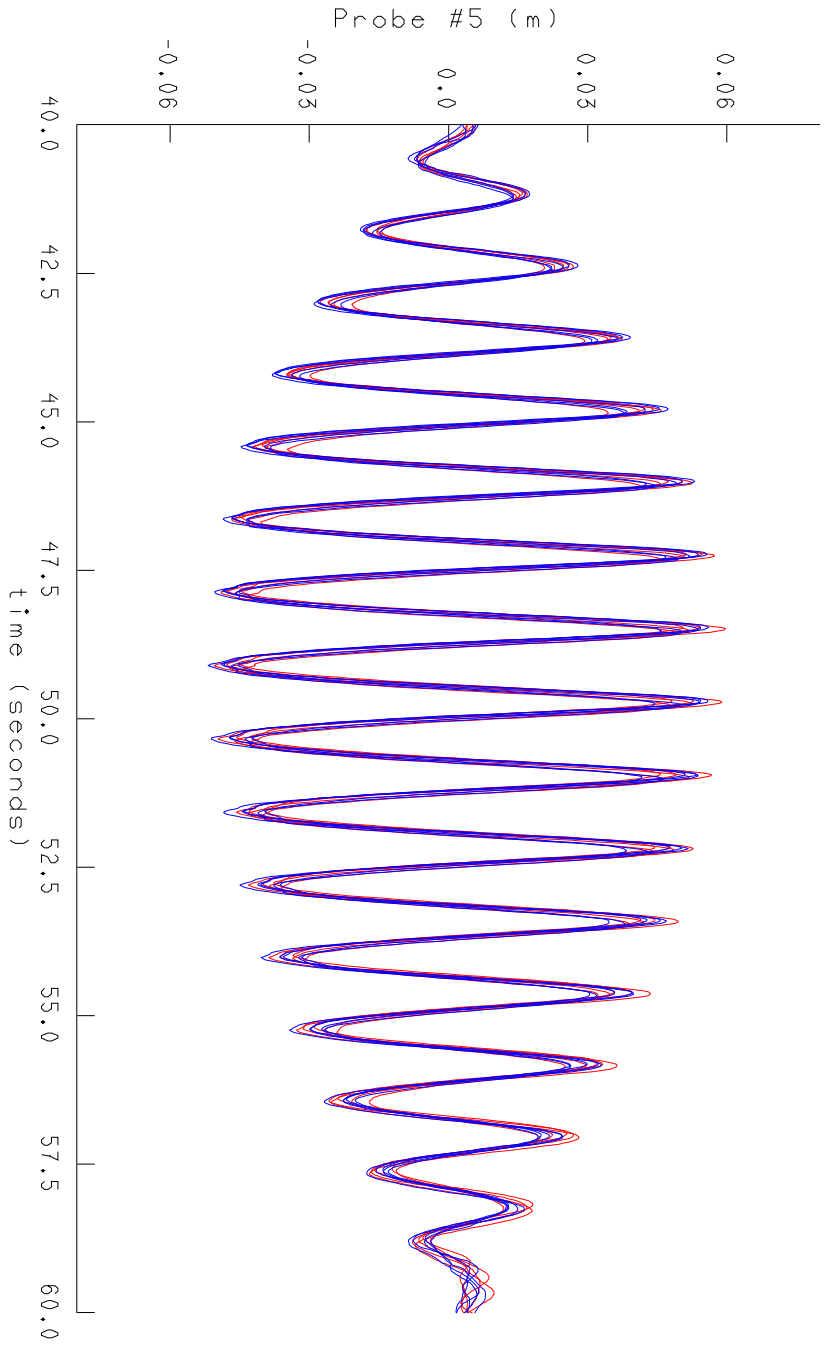

Fig. 16a: Surface elevations at Probes: 5-4-3-6-7
B4-1 : BIP4_H0P06_T1P25_T1P17

before after

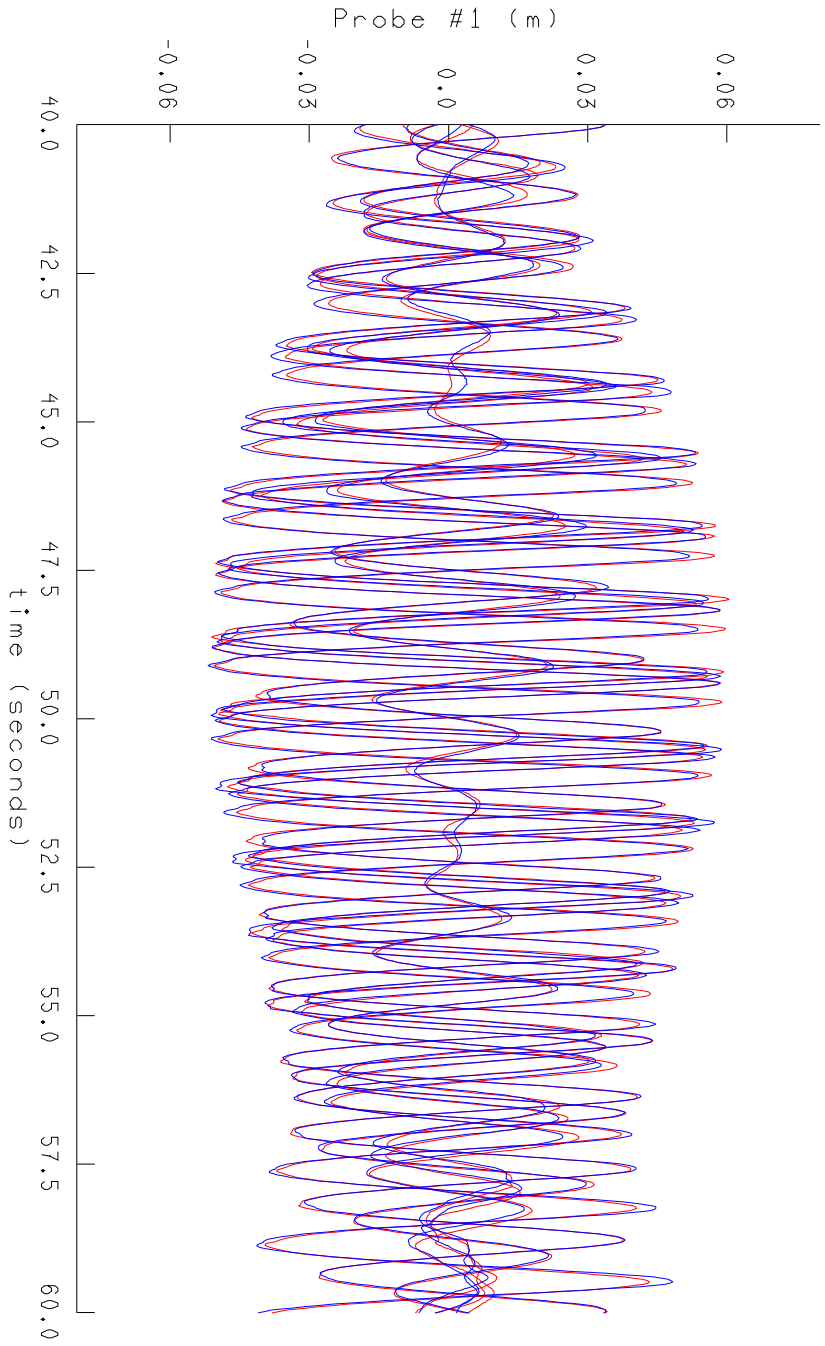

Fig. 16b: Surface elevations at Probes: 1-2-3-8-9-10
B4-1 : BIP4_H0P06_T1P25_T1P17

before after

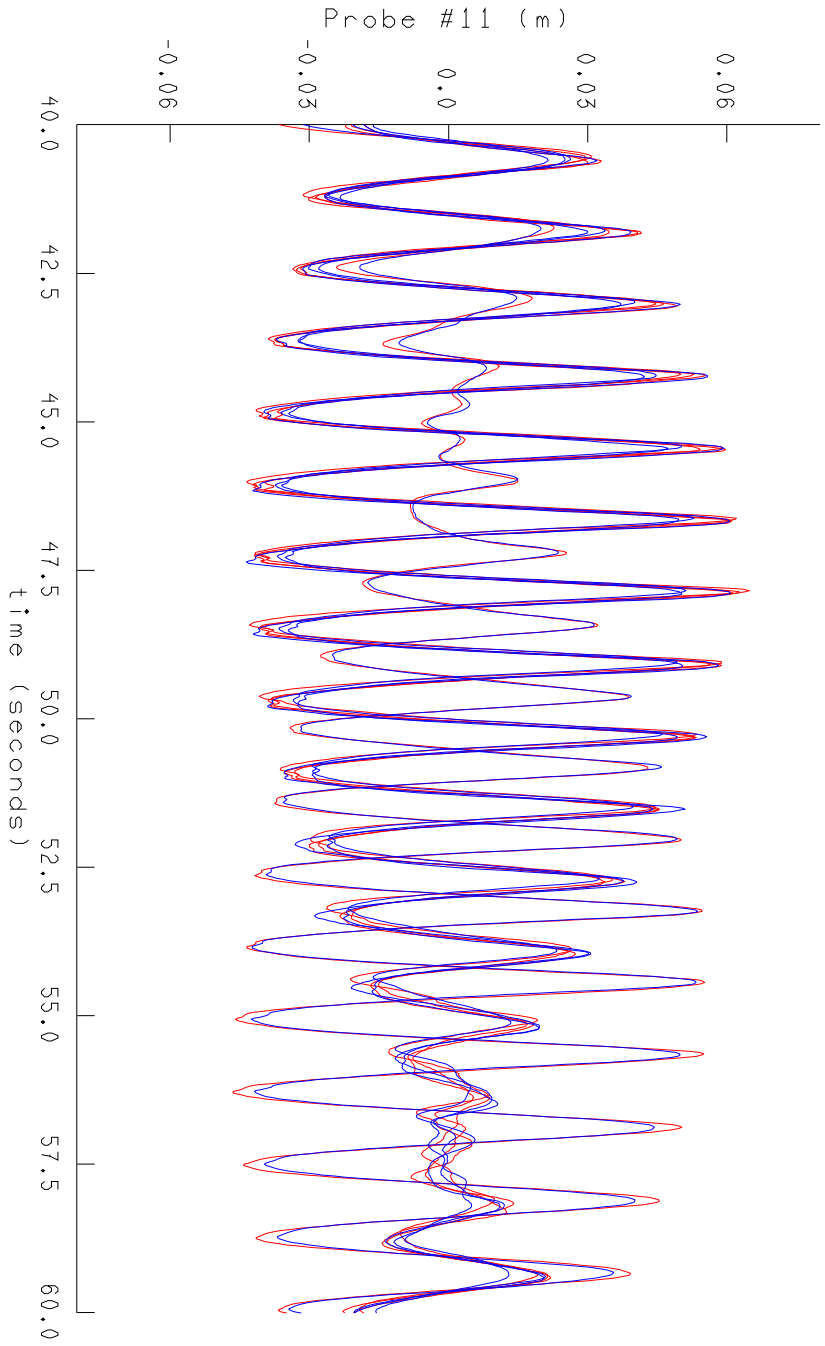

Fig. 16c: Surface elevations at Probes: 11-12-13-14
B4-1 : BIP4_H0P06_T1P25_T1P17

before after

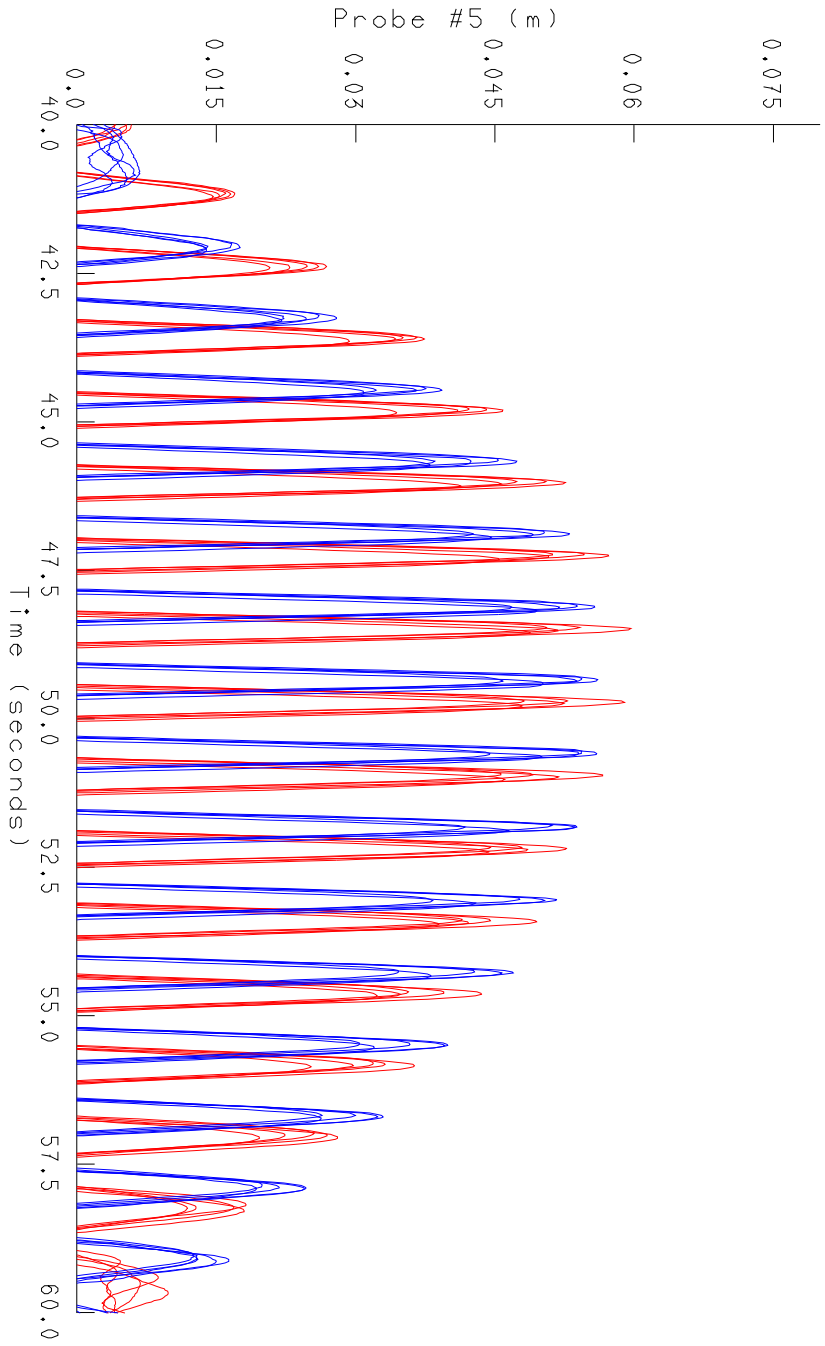

Fig. 16d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B4-1 : BIP4_H0P06_T1P25_T1P17

before after

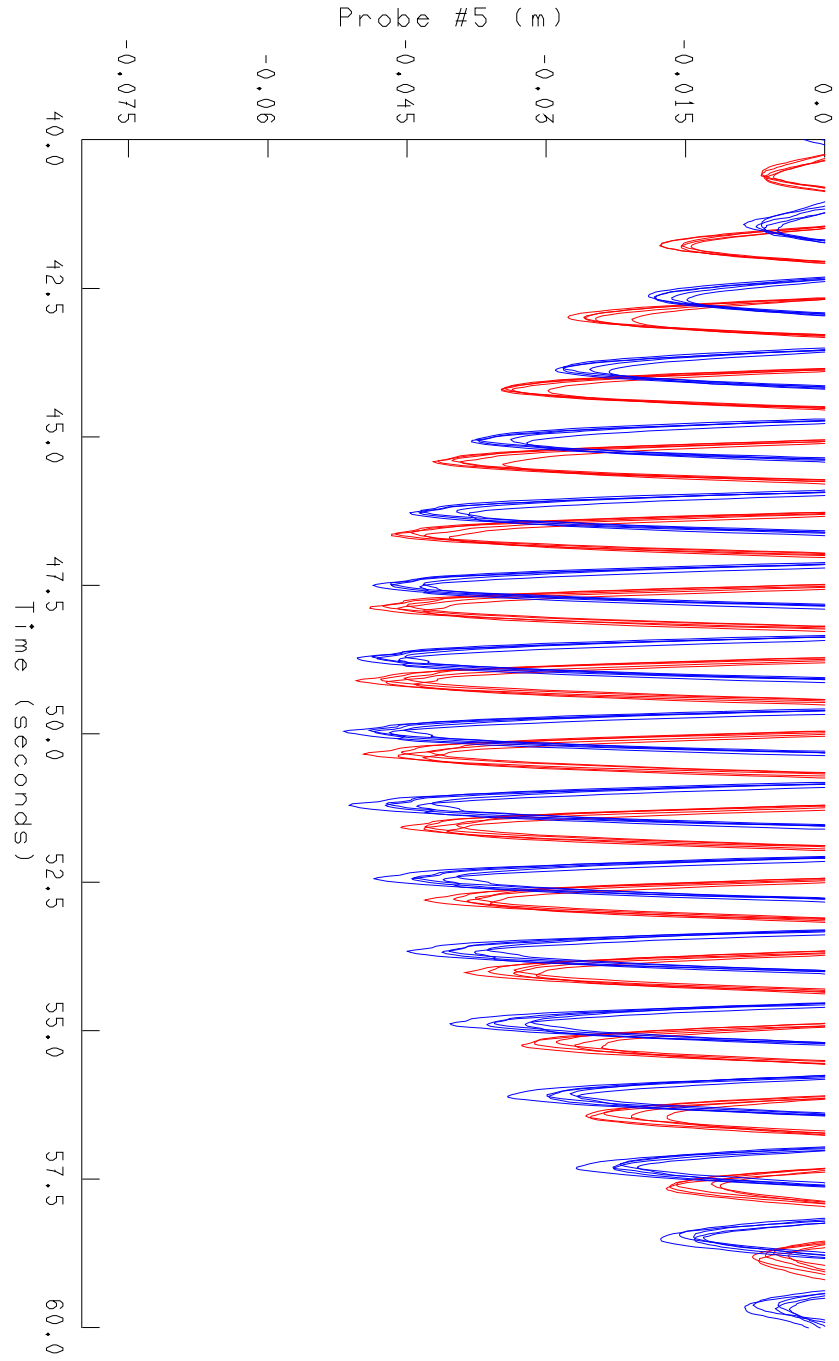

Fig. 16e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B4-1 : BIP4_H0P06_T1P25_T1P17

before after

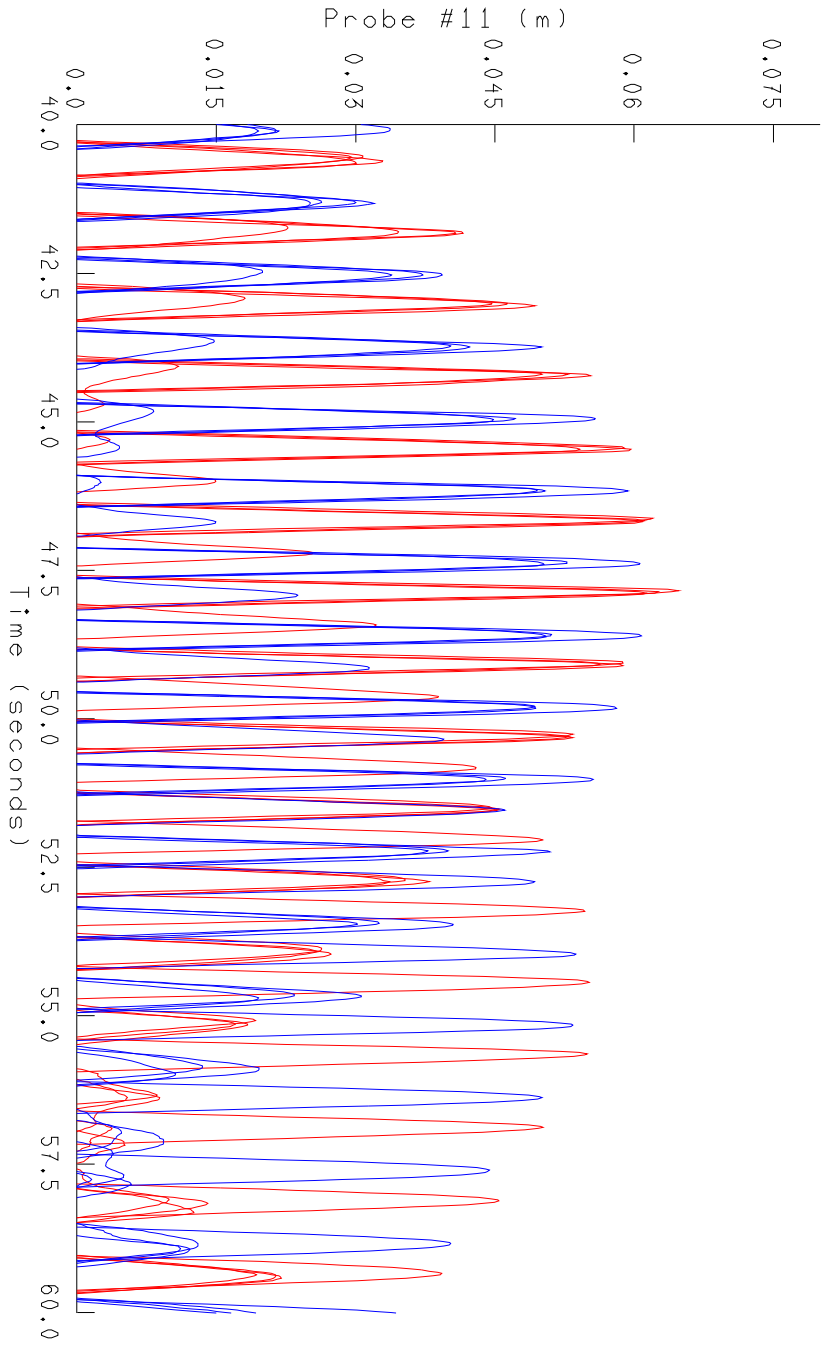

Fig. 16f: Surface elevations at Probes: 11-12-13-14 (Crest)
B4-1 : BIP4_H0P06_T1P25_T1P17

before after

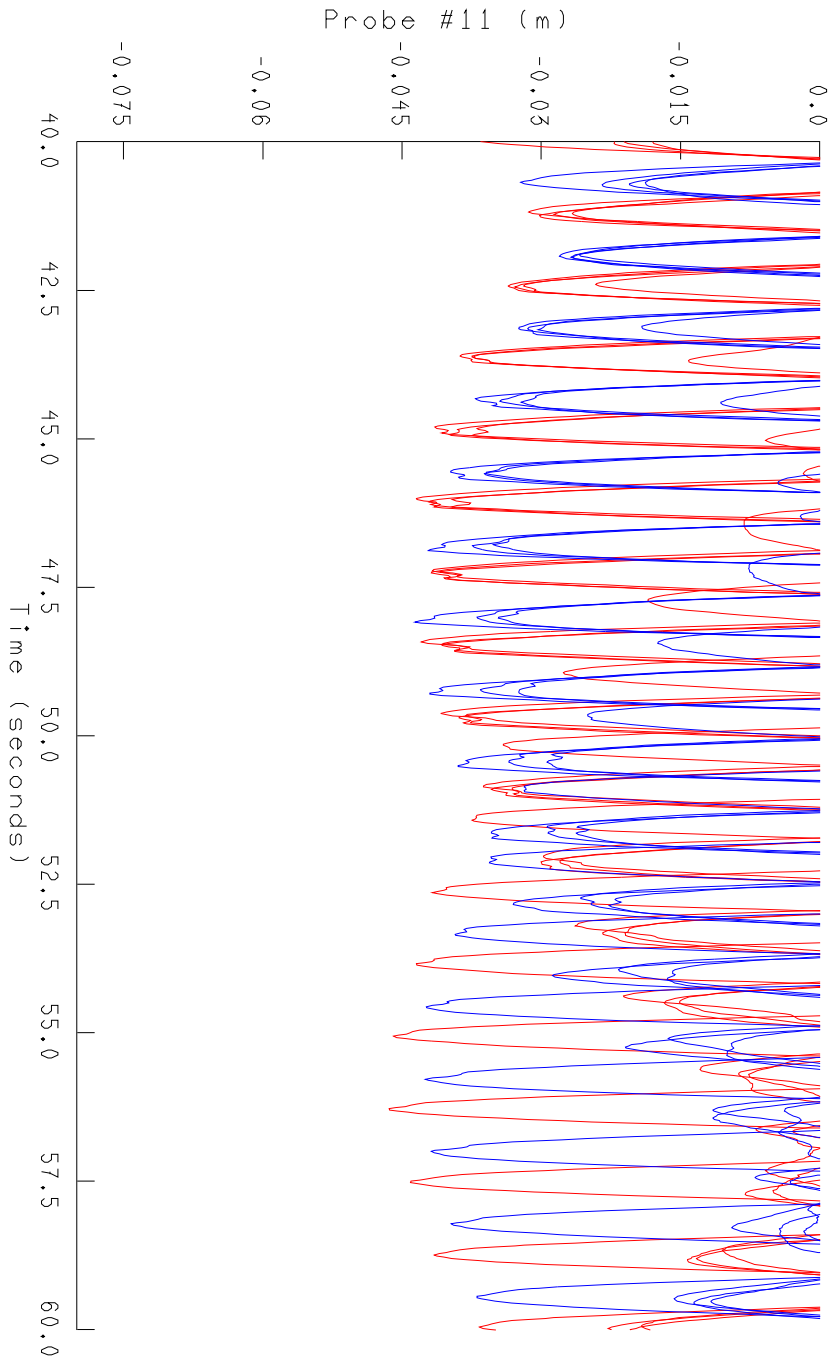

Fig. 16g: Surface elevations at Probes: 11-12-13-14 (Trough)
B4-1 : BIP4_H0P06_T1P25_T1P17

before after

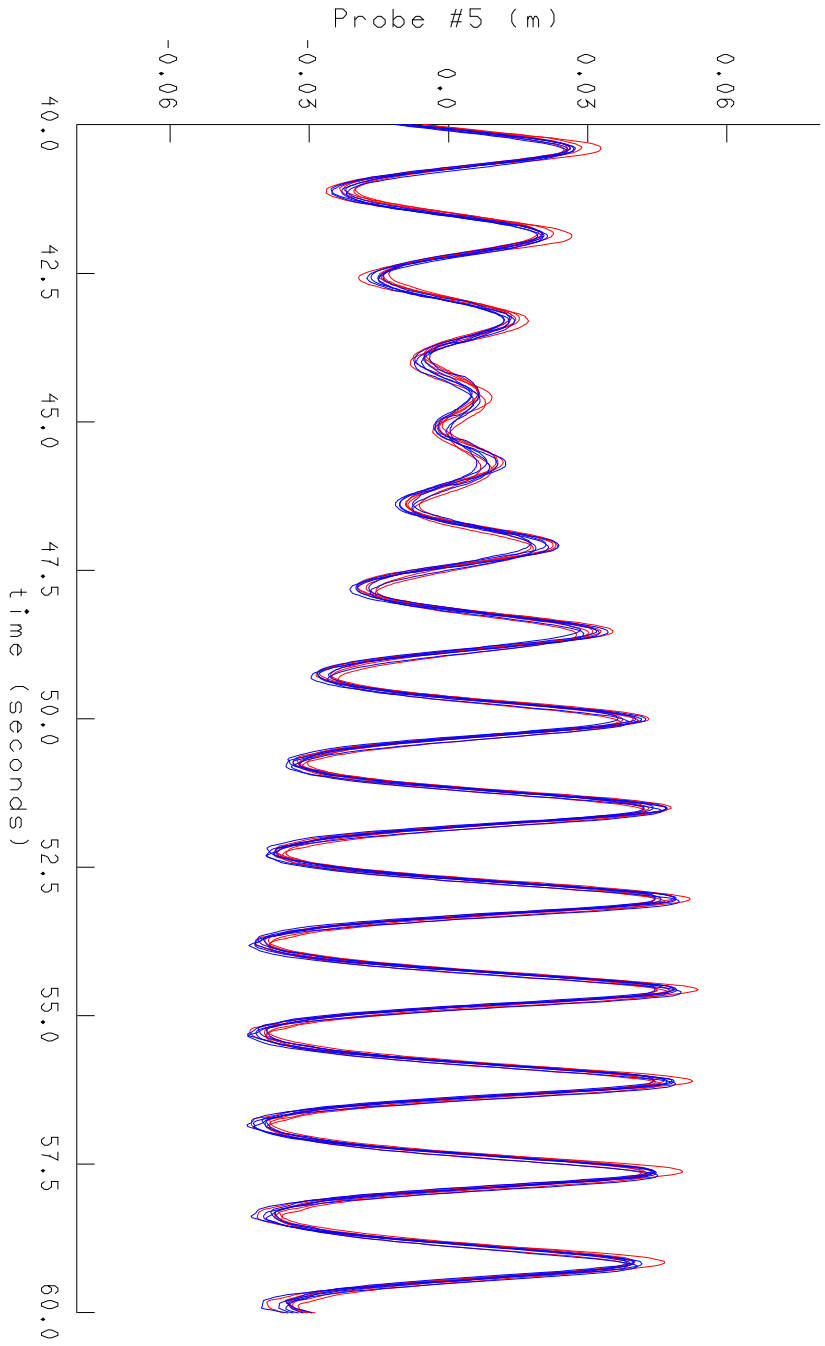

Fig. 17a: Surface elevations at Probes: 5-4-3-6-7
B4-2 : BIP4_H0P06_T1P55_T1P45

before after

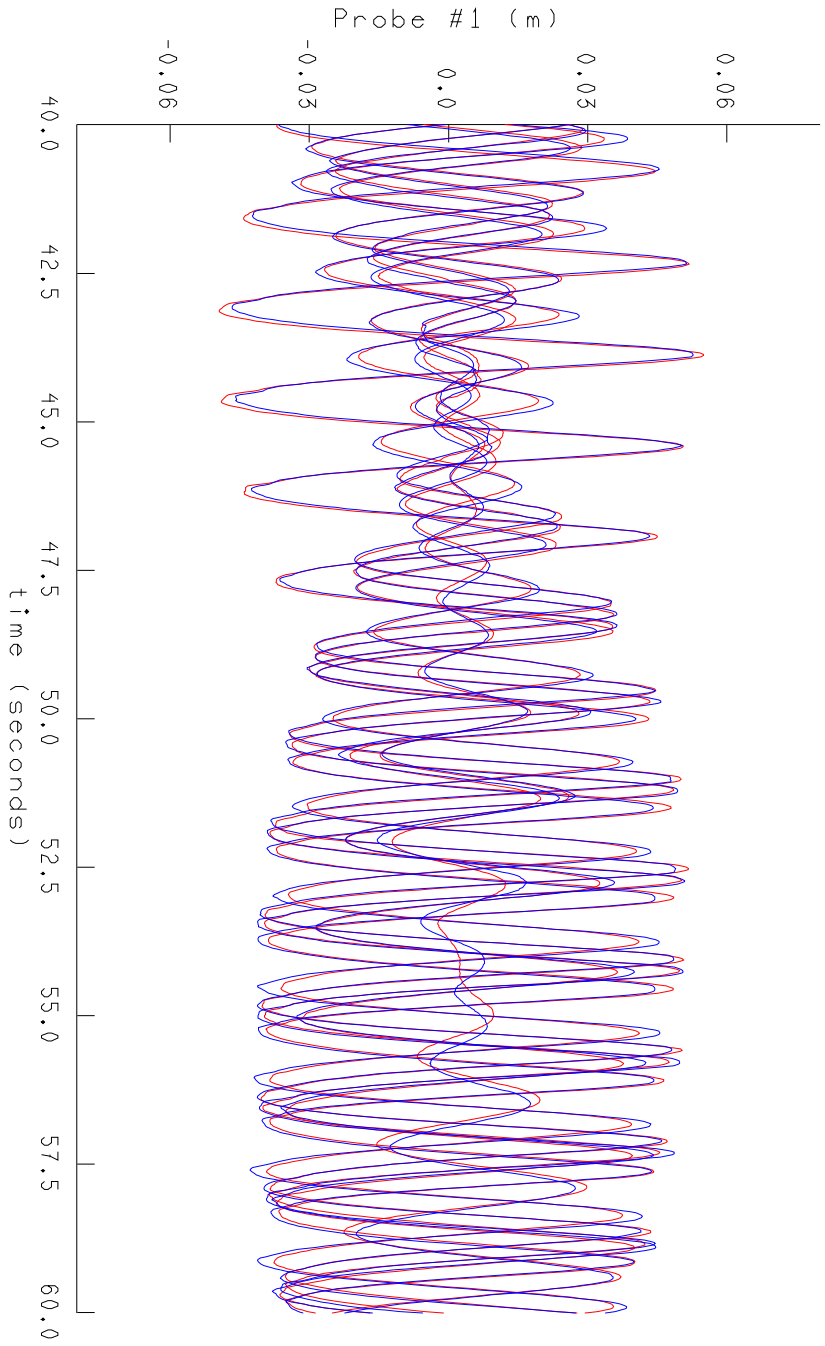

Fig. 17b: Surface elevations at Probes: 1-2-3-8-9-10
B4-2 : BIP4_H0P06_ T1P55_T1P45

before after

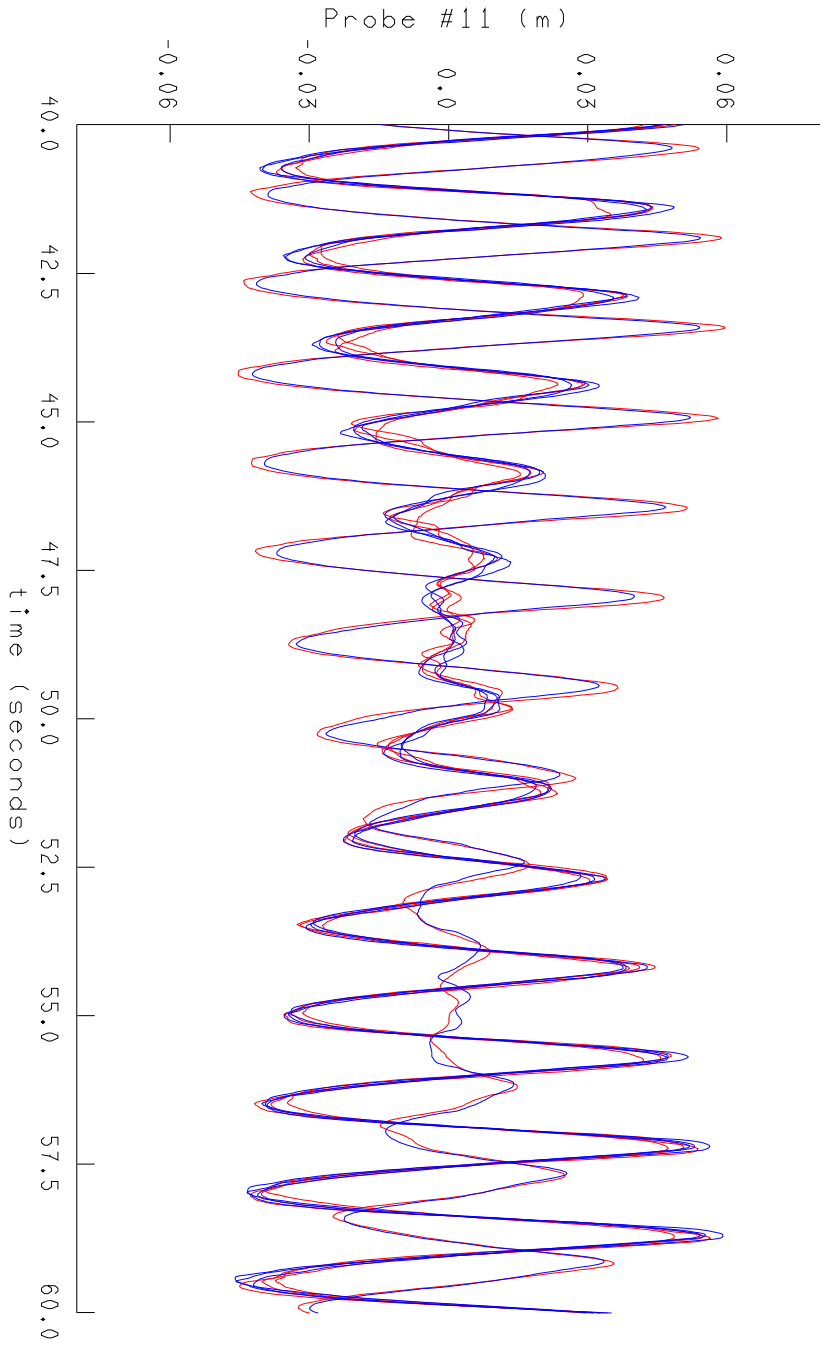

Fig. 17c: Surface elevations at Probes: 11-12-13-14
B4-2 : BIP4_H0P06_ T1P55_T1P45

before after

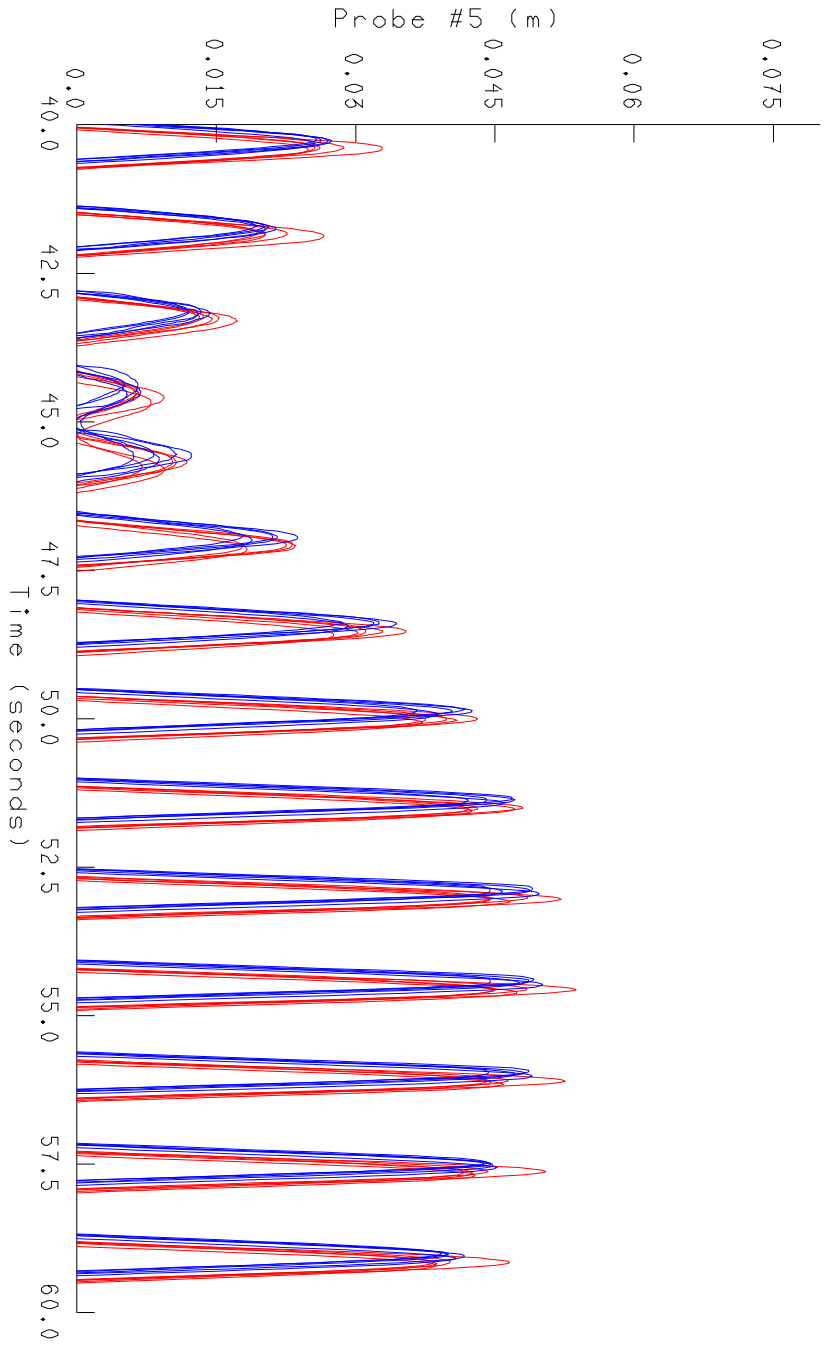

Fig. 17d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B4-2 : BIP4_H0P06_ T1P55_T1P45

before after

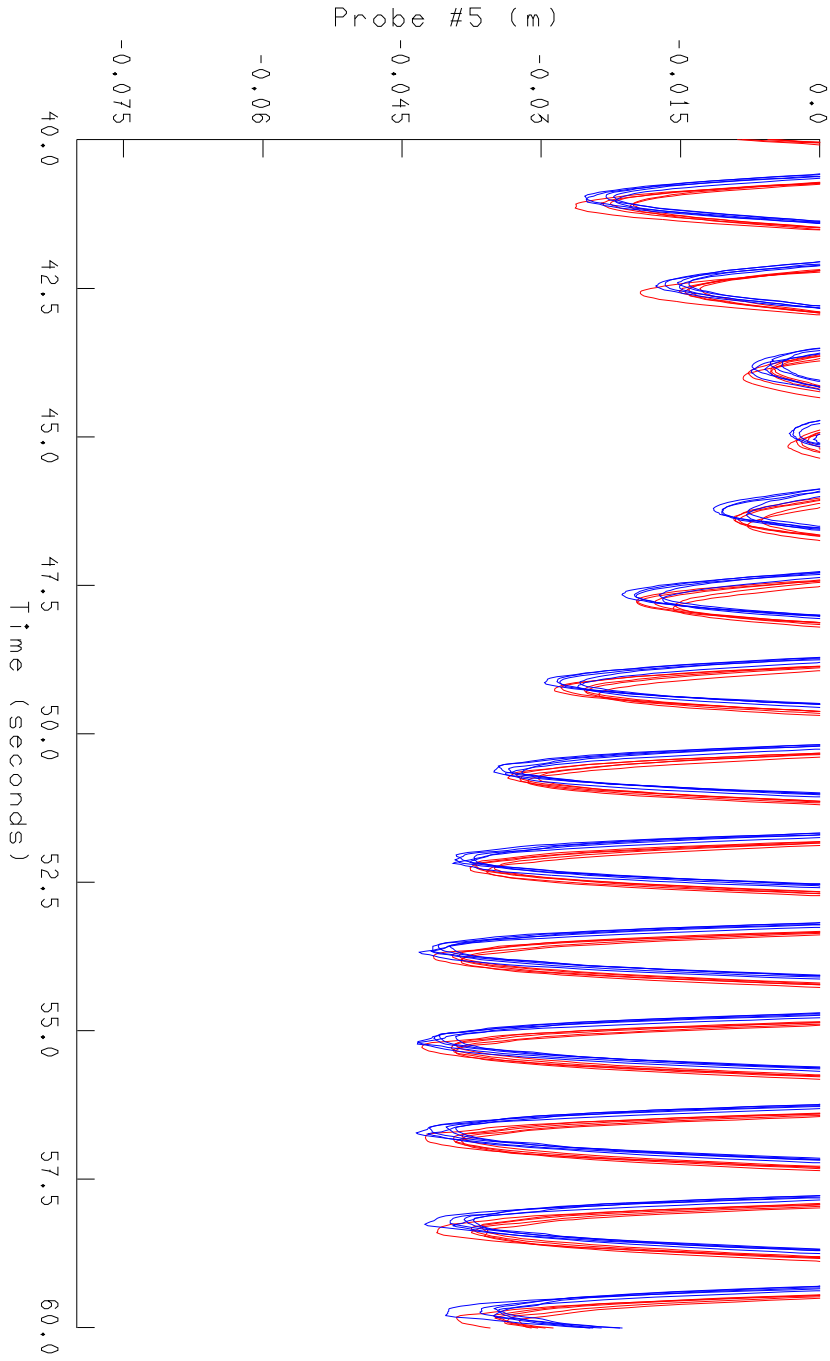

Fig. 17e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B4-2 : BIP4_H0P06_ T1P55_T1P45

before after

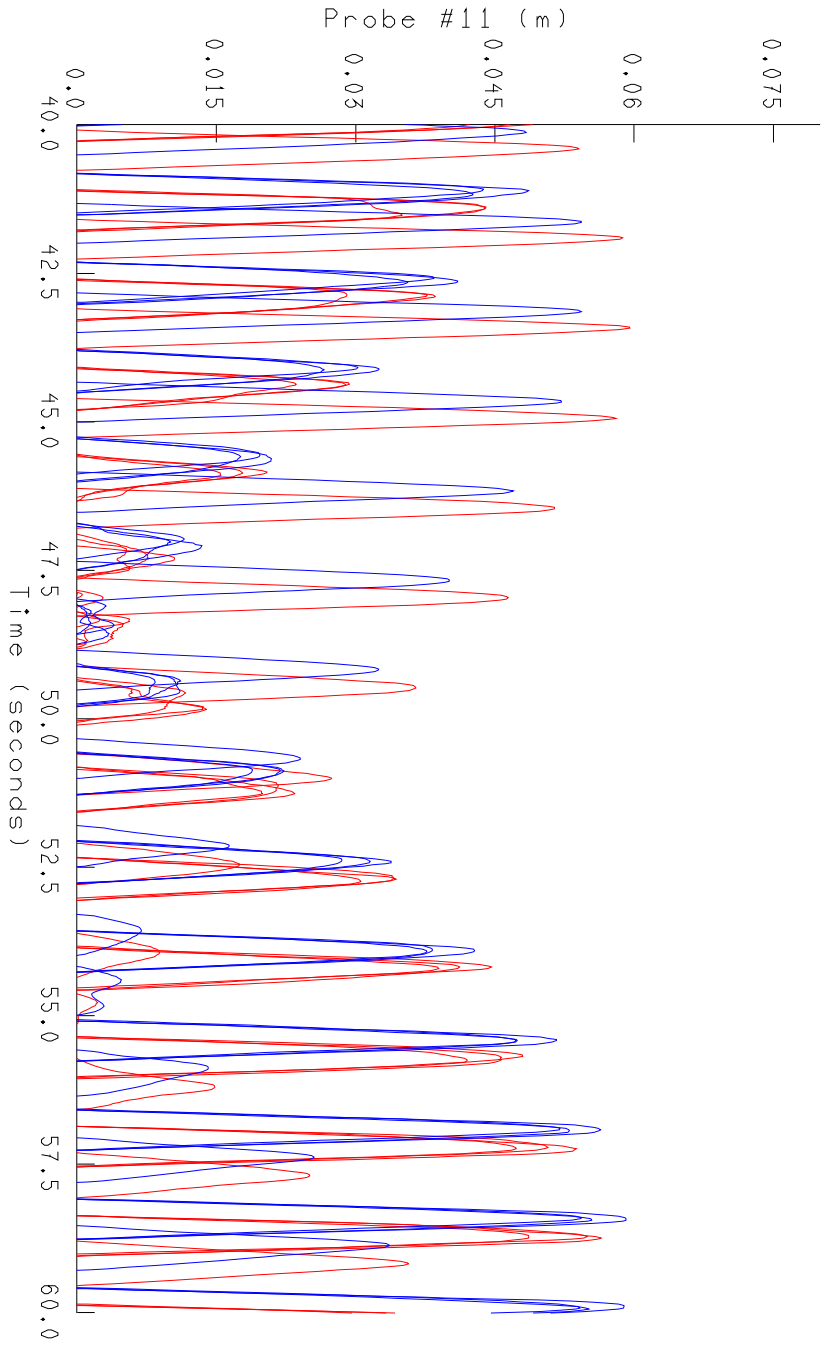

Fig. 17f: Surface elevations at Probes: 11-12-13-14 (Crest)
B4-2 : BIP4_H0P06_ T1P55_T1P45

before after

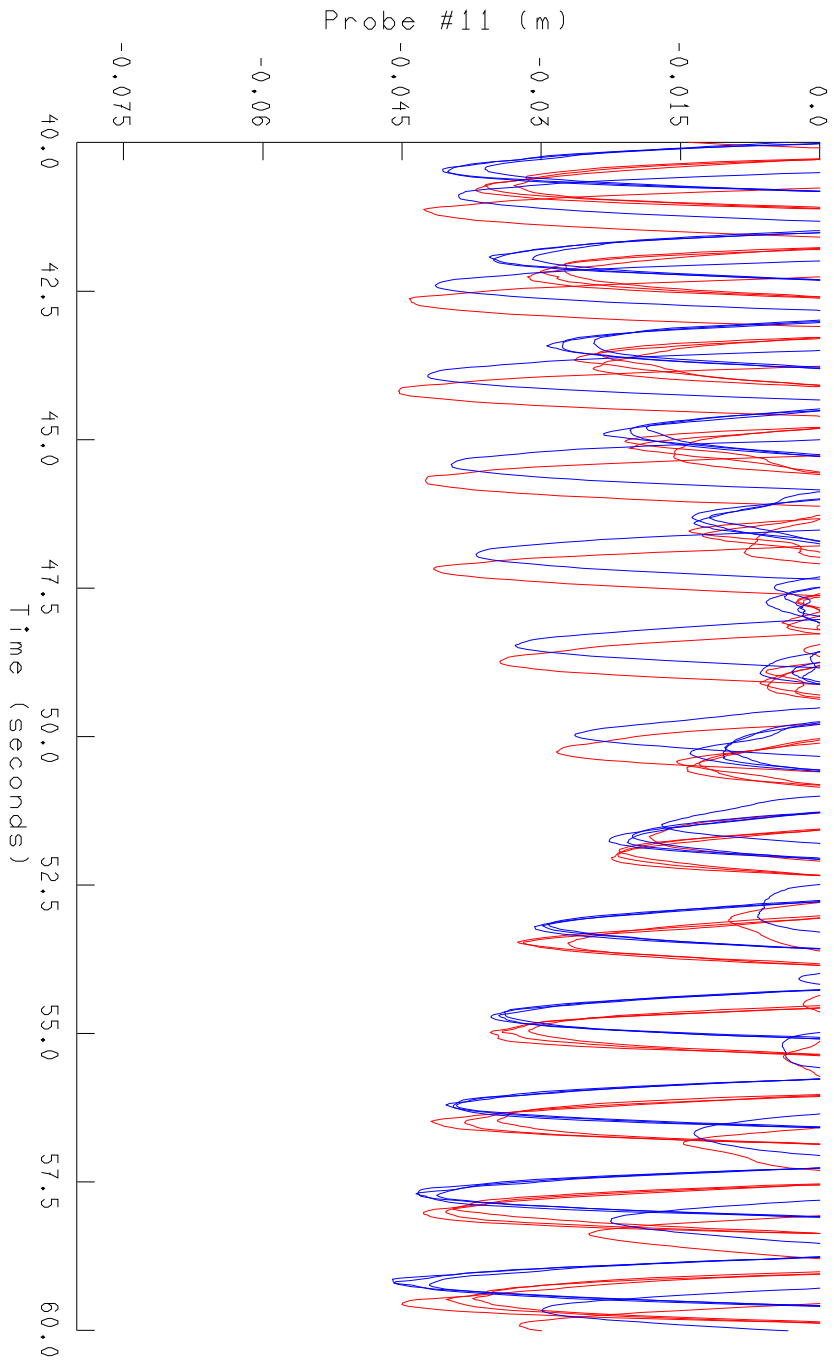

Fig. 17g: Surface elevations at Probes: 11-12-13-14 (Trough)
B4-2 : BIP4_H0P06_ T1P55_T1P45

before after

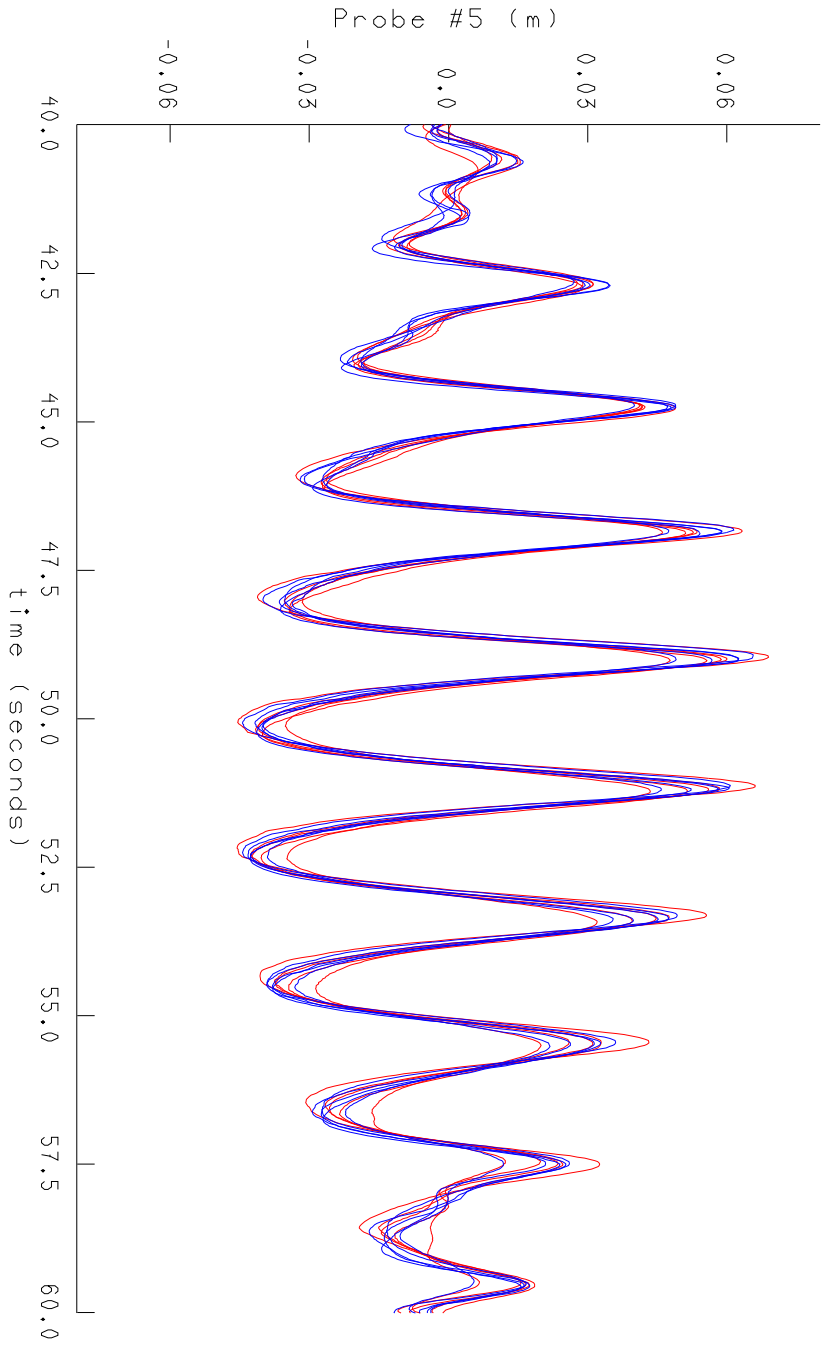

Fig. 18a: Surface elevations at Probes: 5-4-3-6-7
B4-3 : BIP4_H0P06_T2P22_T2P0

before after

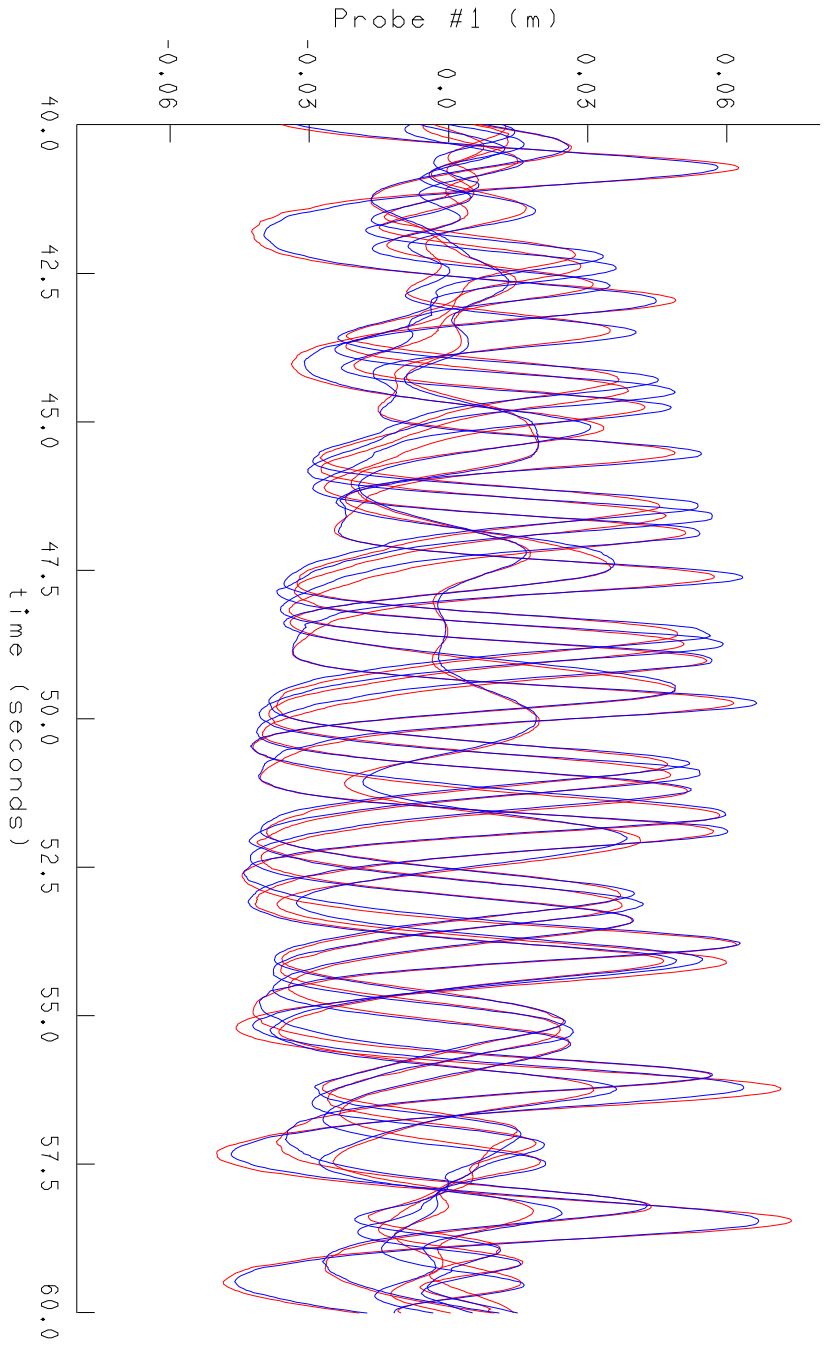

Fig. 18b: Surface elevations at Probes: 1-2-3-8-9-10
B4-3 : BIP4_H0P06_ T2P22_T2P0

before after

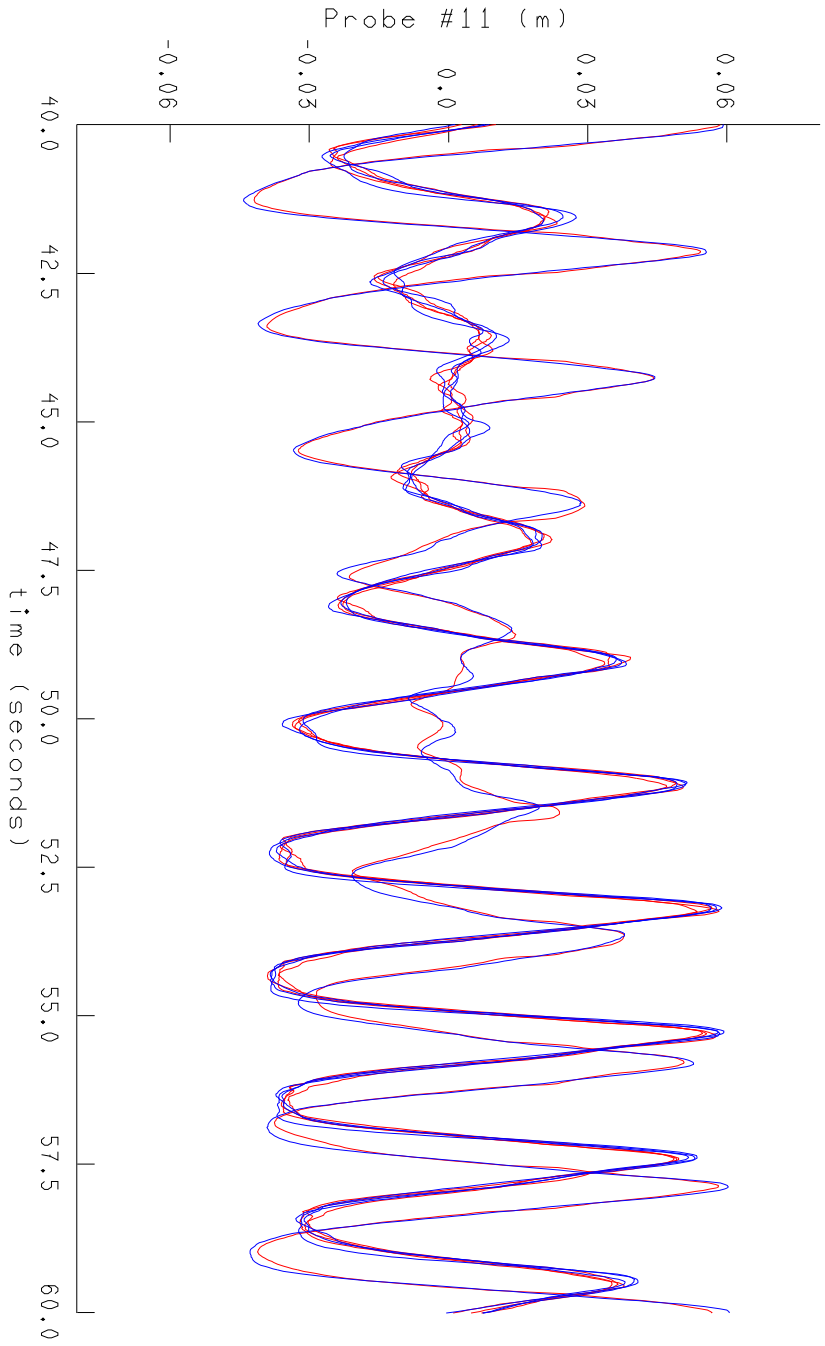

Fig. 18c: Surface elevations at Probes: 11-12-13-14
B4-3 : BIP4_H0P06_ T2P22_T2P0

before after

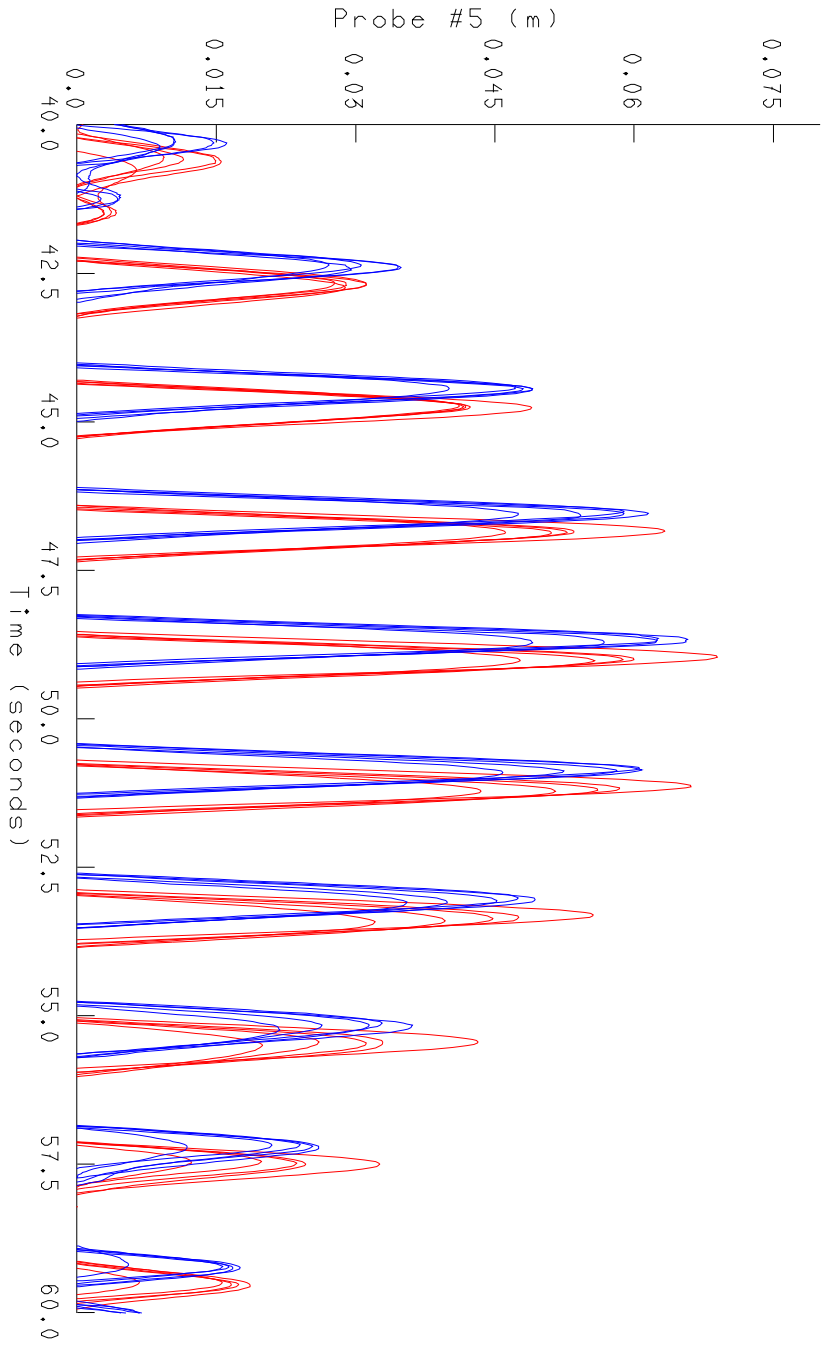

Fig. 18d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B4-3 : BIP4_H0P06_ T2P22_T2P0

before after

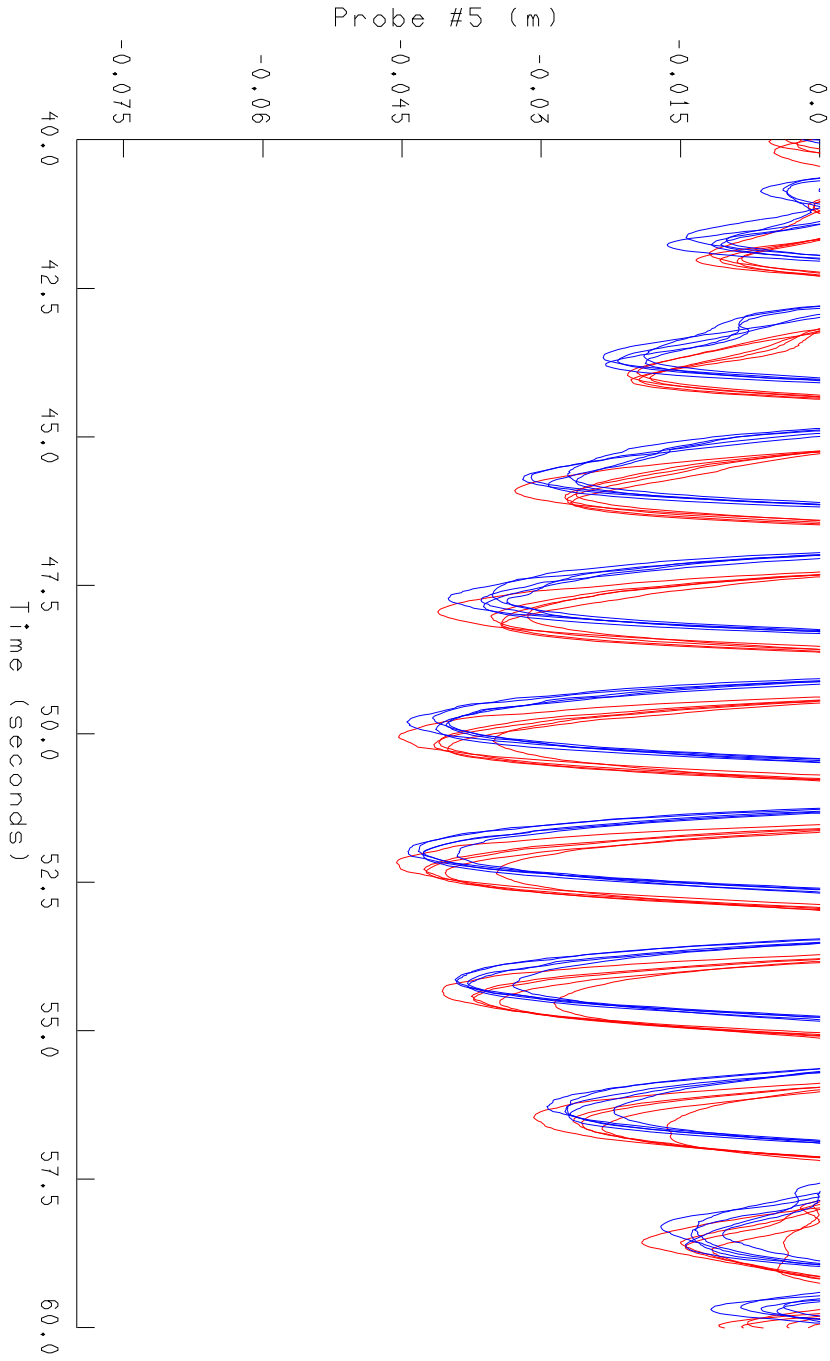

Fig. 18e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B4-3 : BIP4_H0P06_ T2P22_T2P0

before after

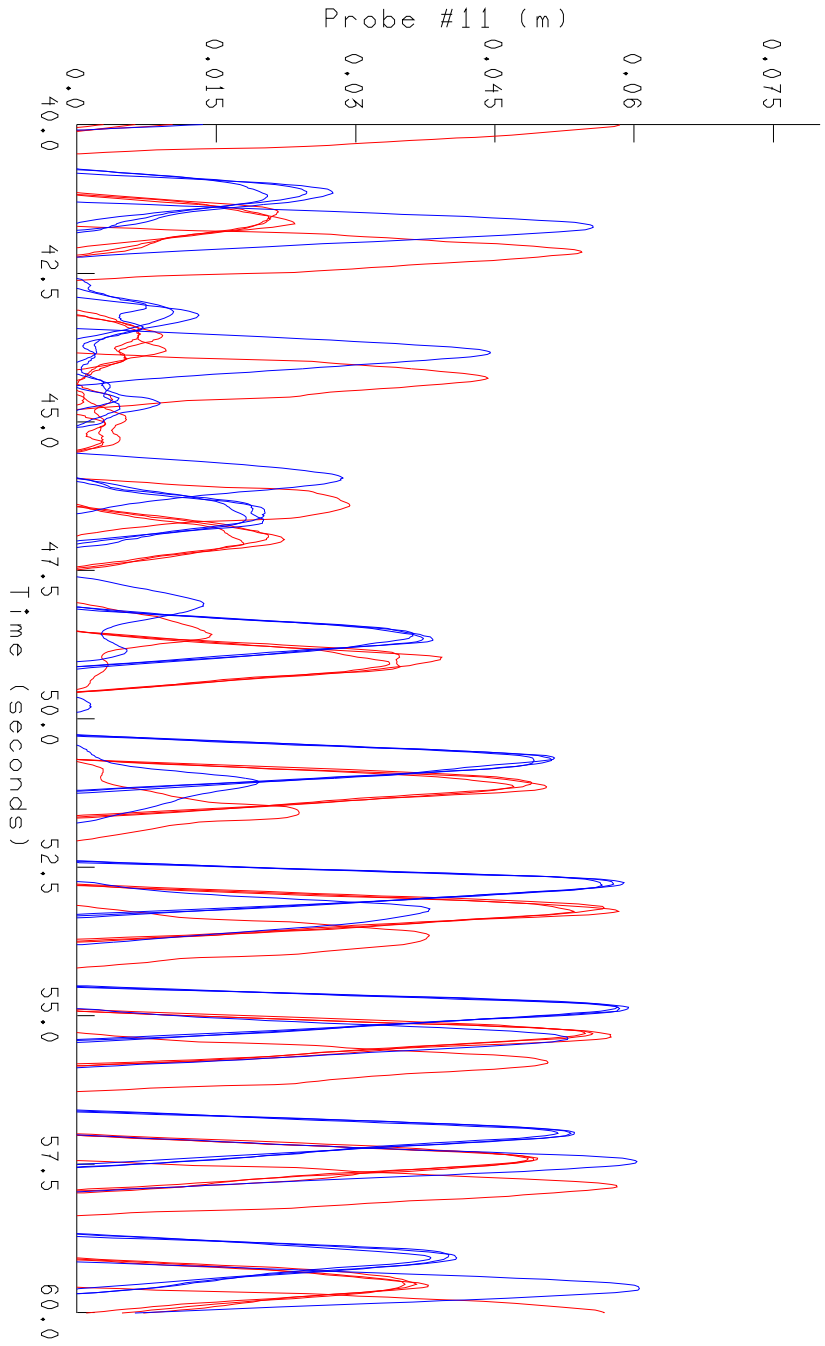

Fig. 18f: Surface elevations at Probes: 11-12-13-14 (Crest)
B4-3 : BIP4_H0P06_ T2P22_T2P0

before after

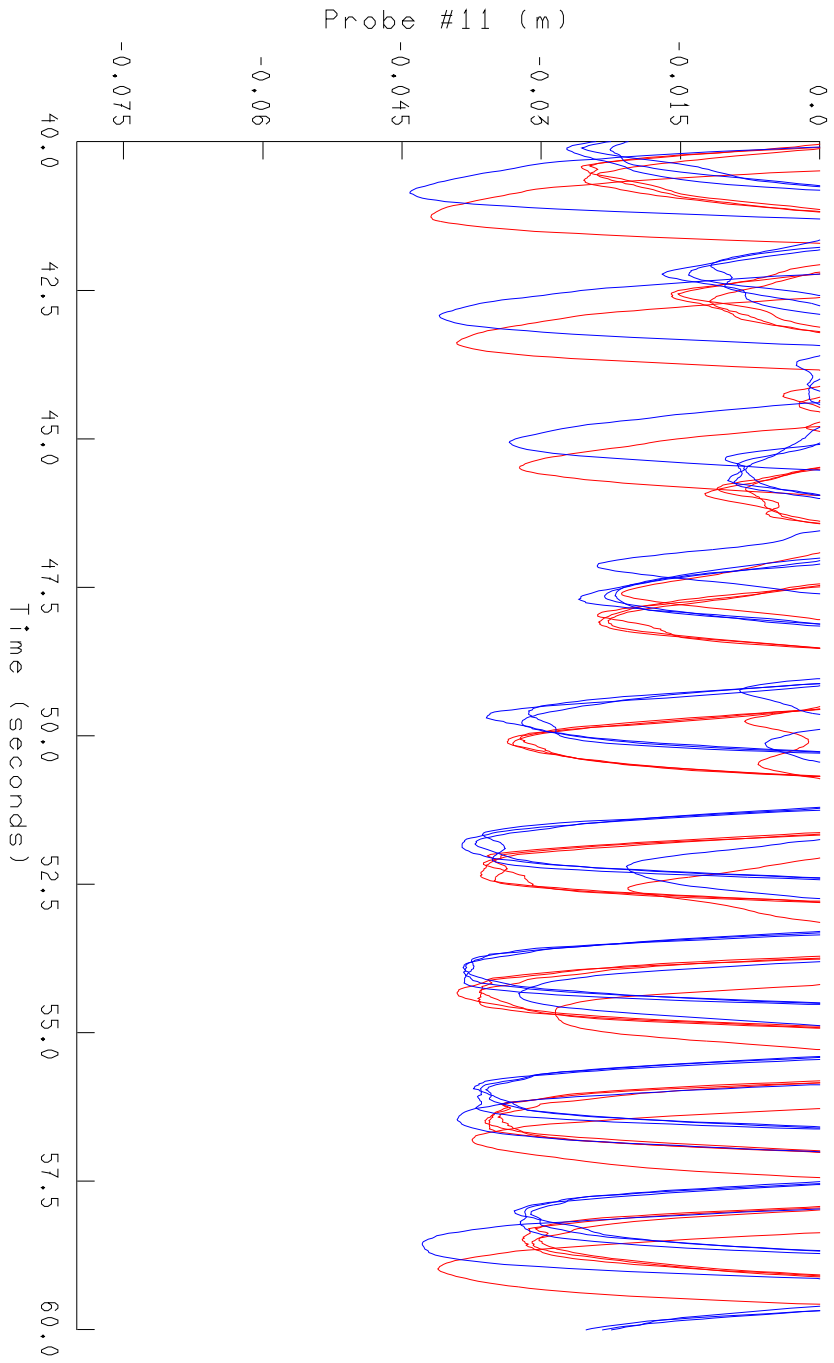

Fig. 18g: Surface elevations at Probes: 11-12-13-14 (Trough)
B4-3 : BIP4_H0P06_ T2P22_T2P0

before after

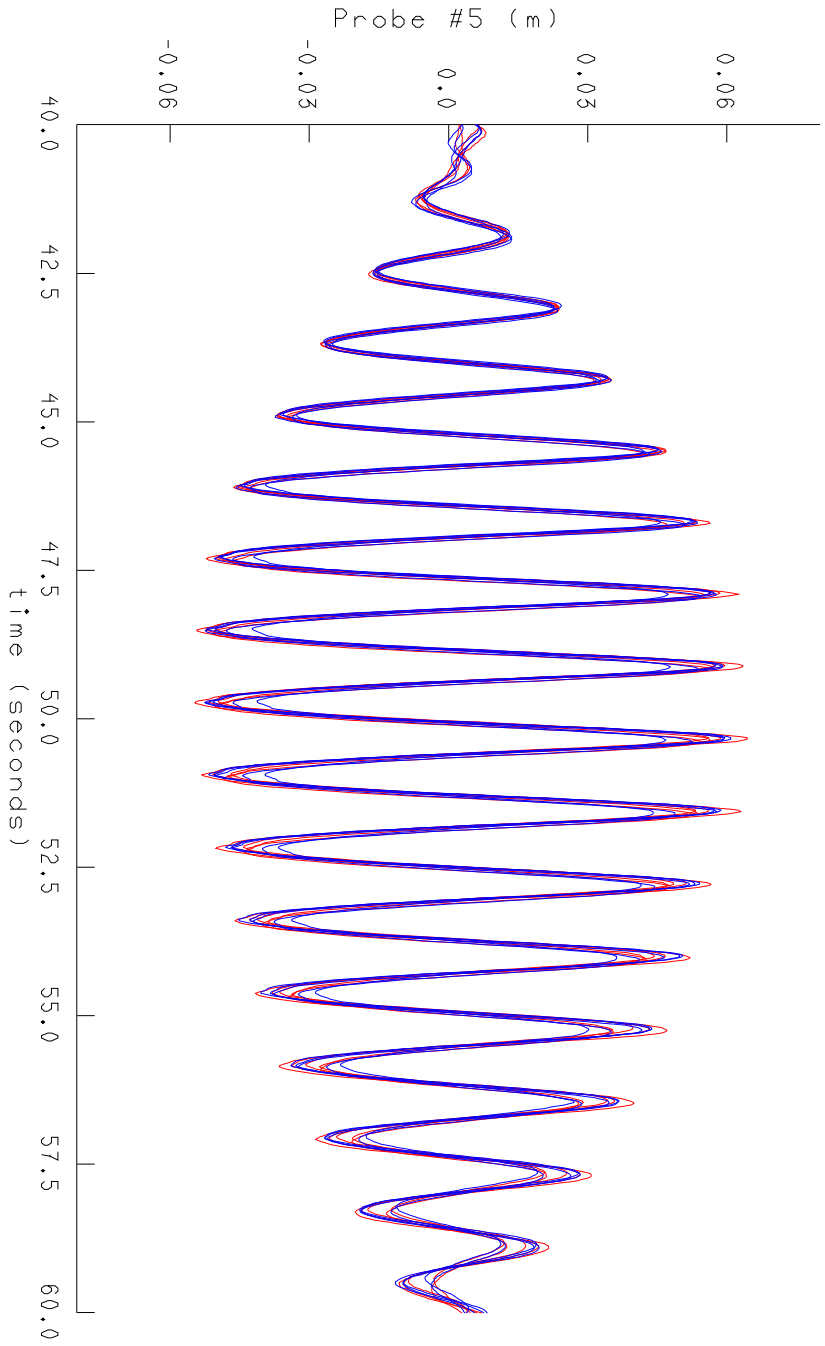

Fig. 19a: Surface elevations at Probes: 5-4-3-6-7
B5-1 : BIP5_H0P06_T1P25_T1P20

before after

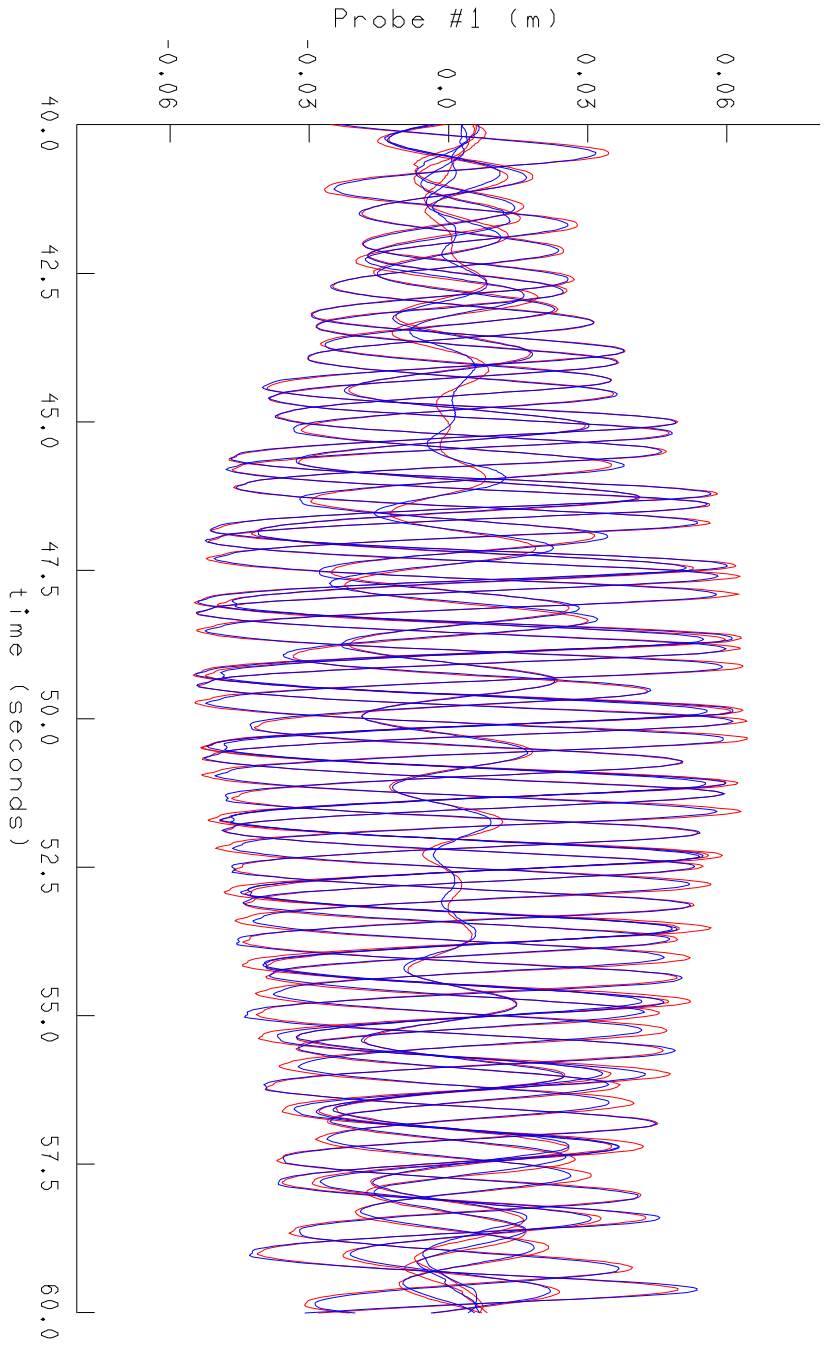

Fig. 19b: Surface elevations at Probes: 1-2-3-8-9-10
B5-1 : BIP5_H0P06_T1P25_T1P20

before after

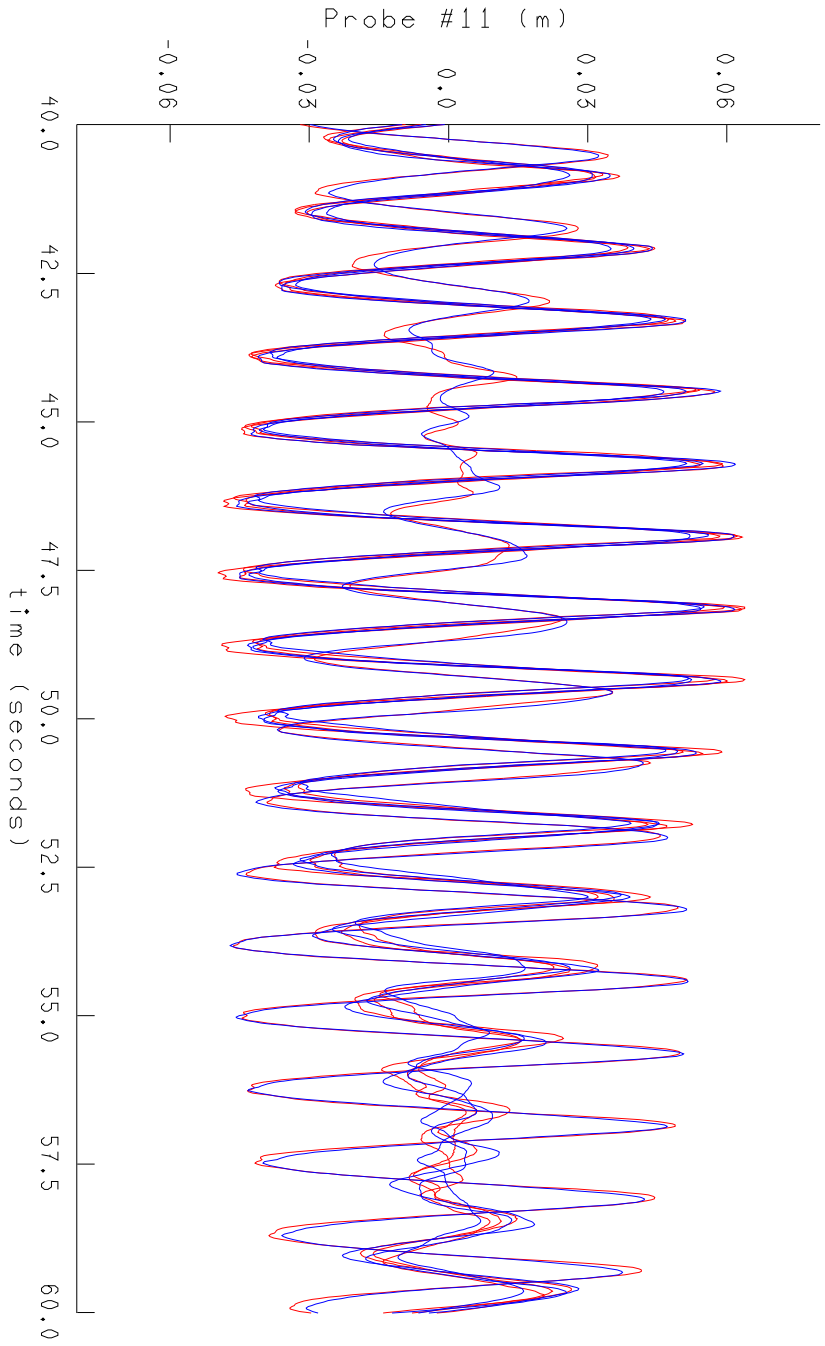

Fig. 19c: Surface elevations at Probes: 11-12-13-14
B5-1 : BIP5_H0P06_T1P25_T1P20

before after

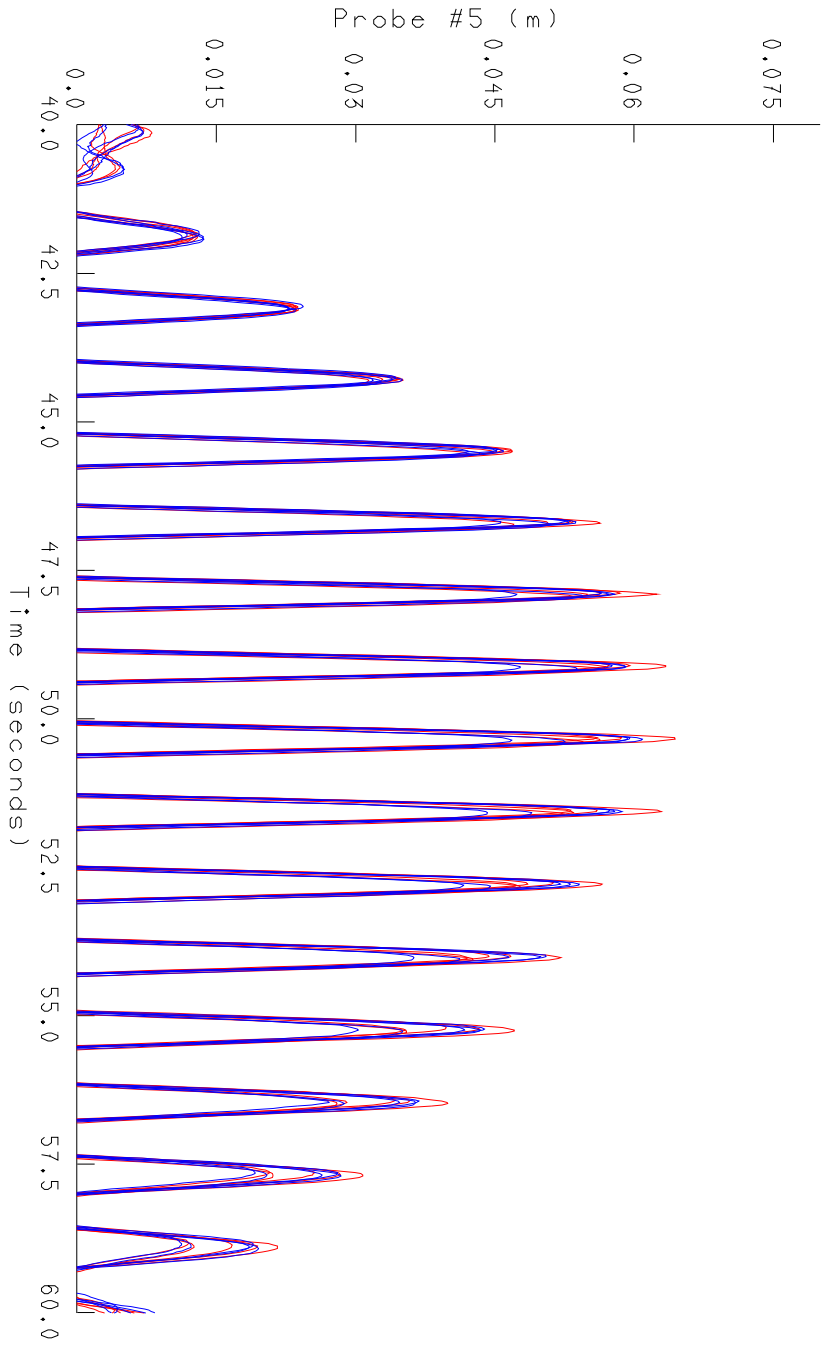

Fig. 19d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B5-1 : BIP5_H0P06_T1P25_T1P20

before after

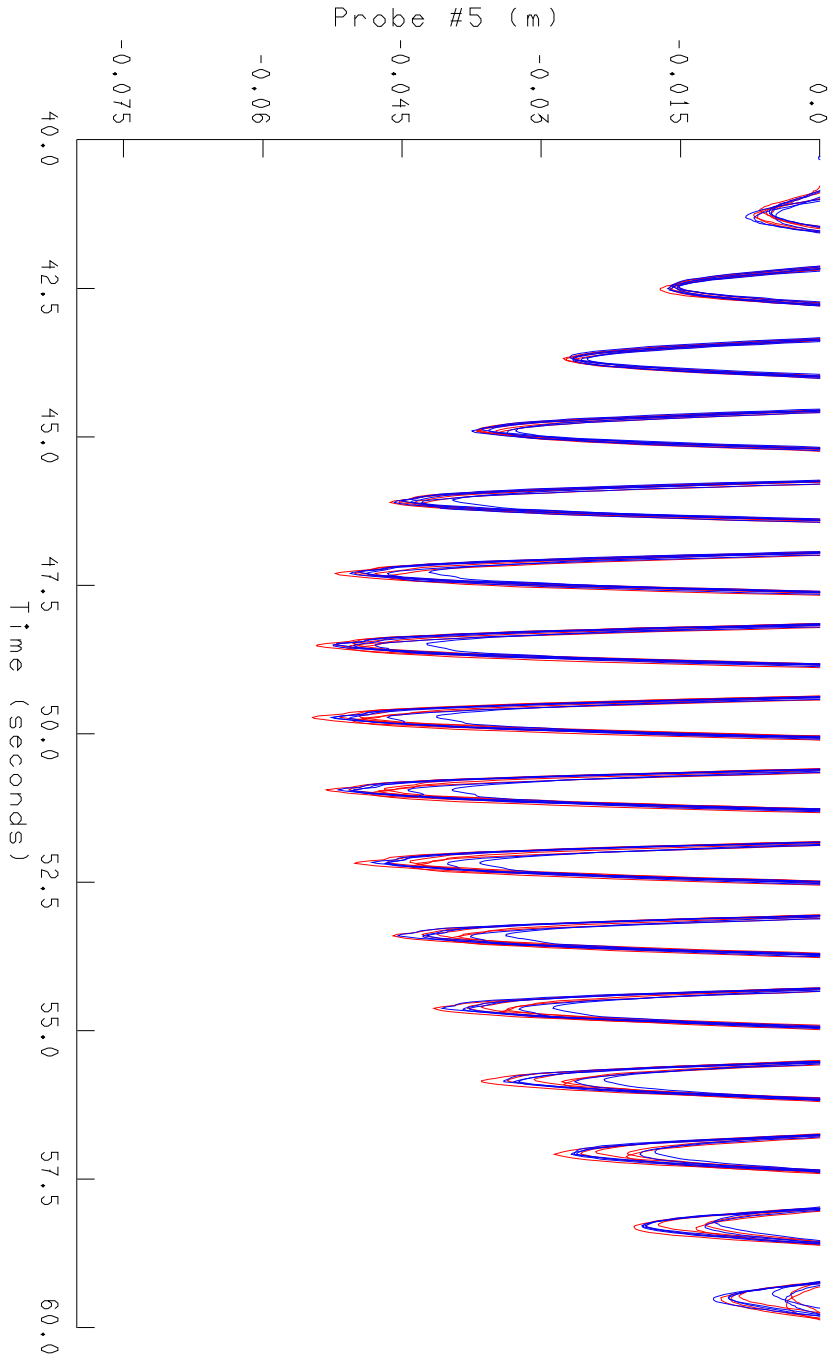

Fig. 19e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B5-1 : BIP5_H0P06_T1P25_T1P20

before after

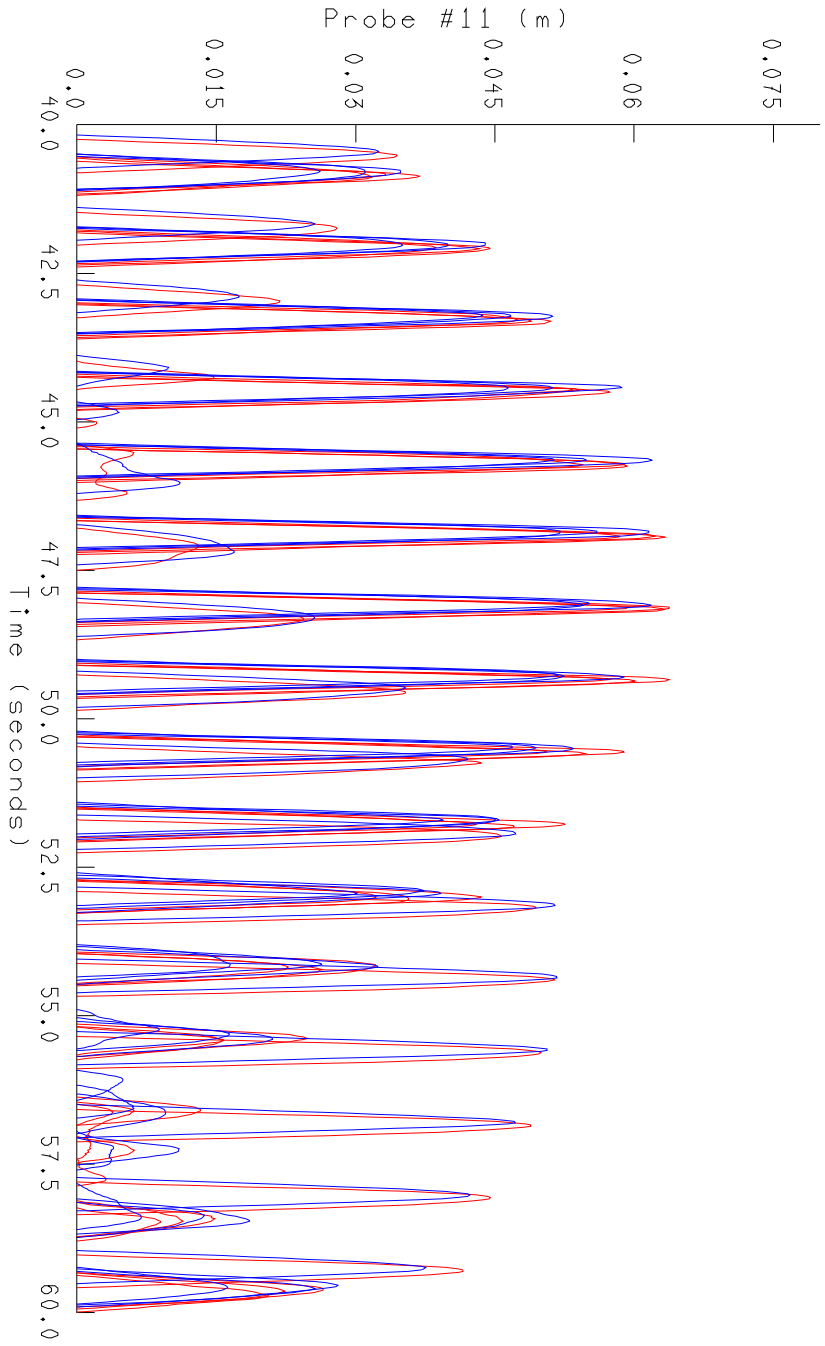

Fig. 19f: Surface elevations at Probes: 11-12-13-14 (Crest)
B5-1 : BIP5_H0P06_T1P25_T1P20

before after

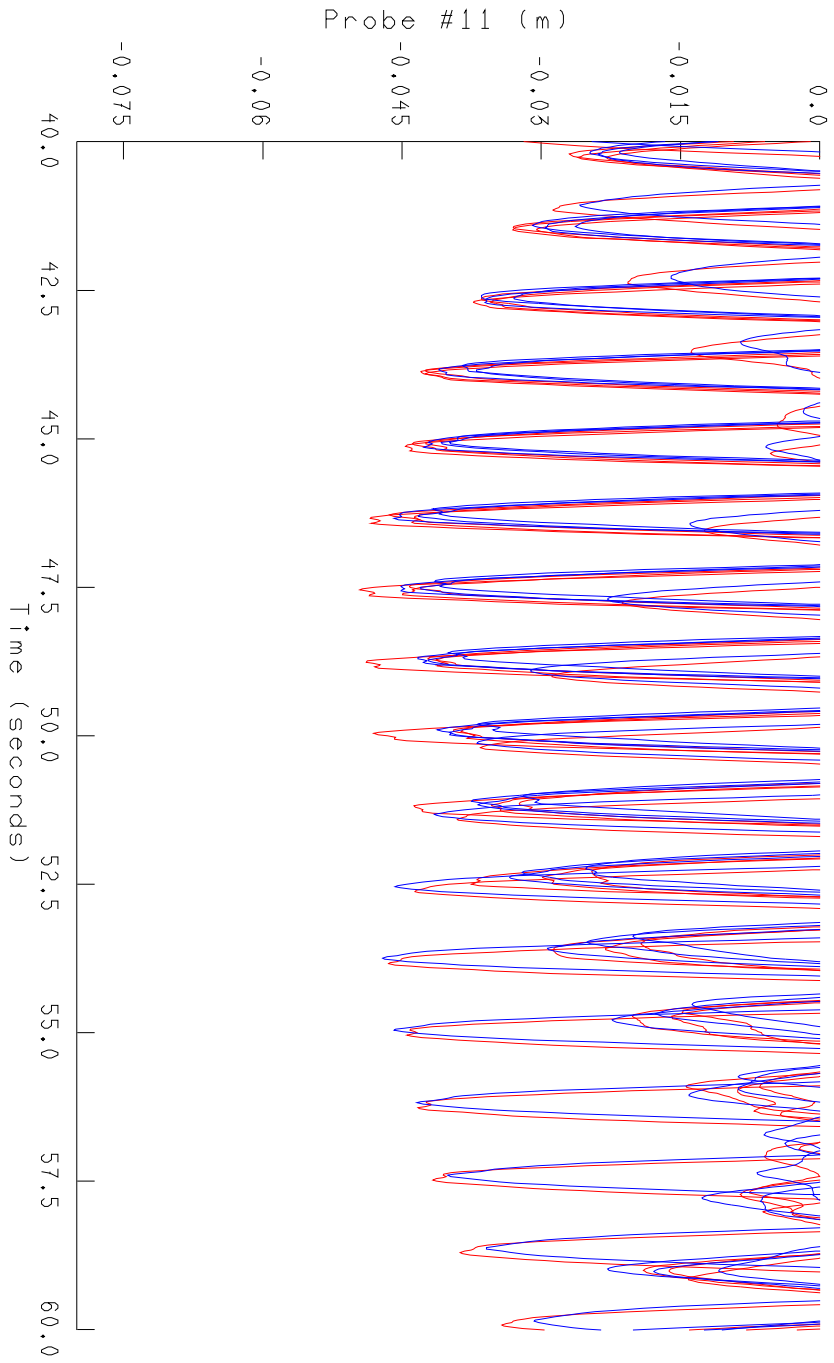

Fig. 19g: Surface elevations at Probes: 11-12-13-14 (Trough)
B5-1 : BIP5_H0P06_T1P25_T1P20

before after

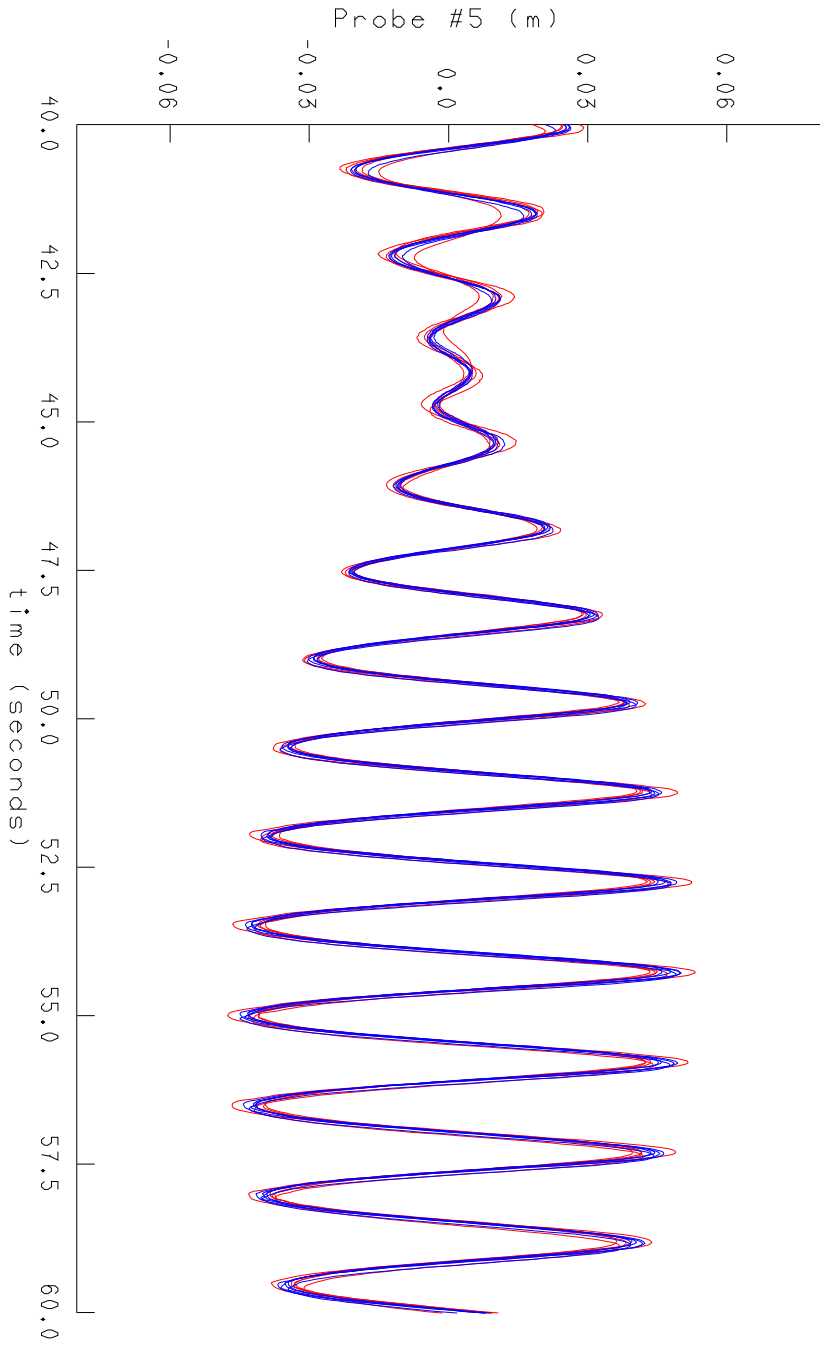

Fig. 20a: Surface elevations at Probes: 5-4-3-6-7
B5-2 : BIP5_H0P06_ T1P55_T1P45

before after

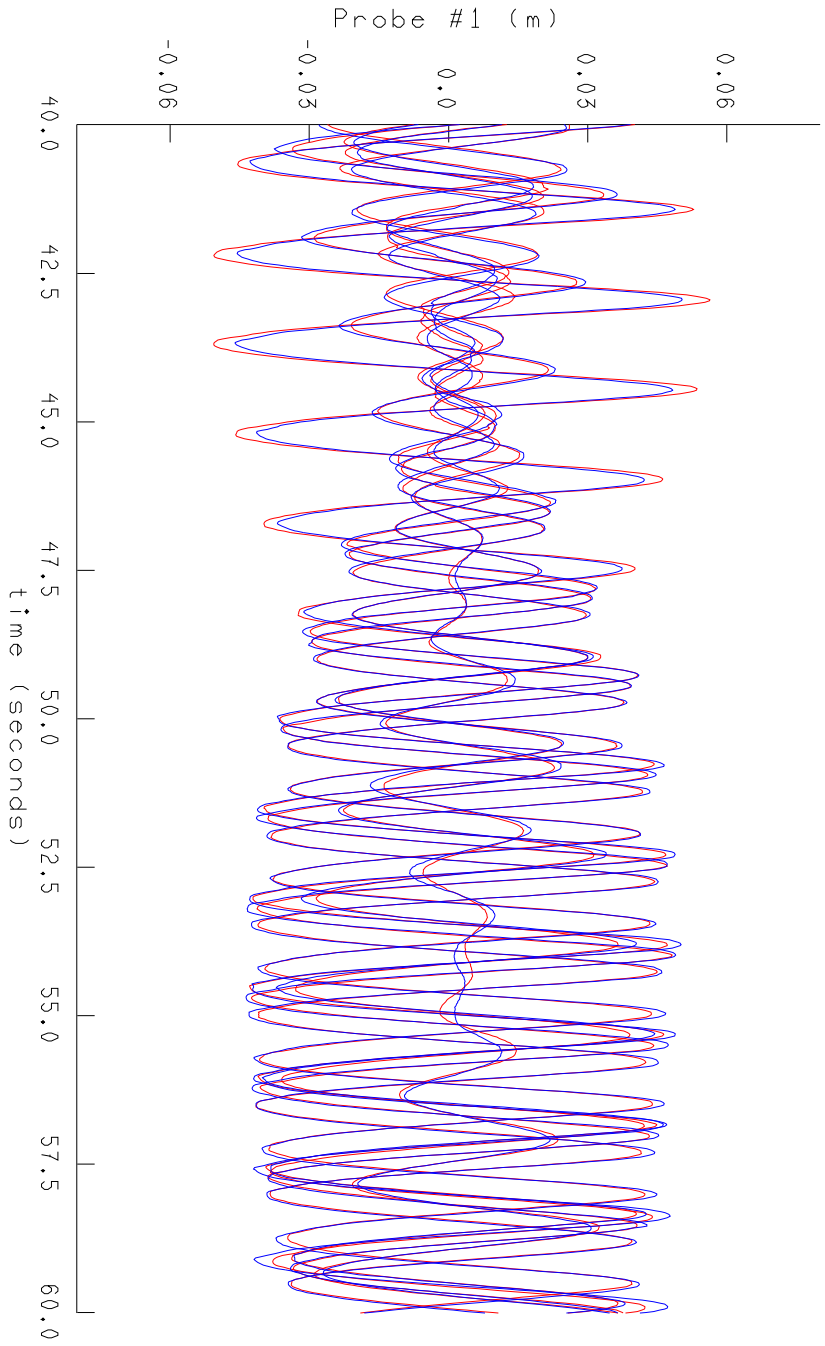

Fig. 20b: Surface elevations at Probes: 1-2-3-8-9-10
B5-2 : BIP5_H0P06_T1P55_T1P45

before after

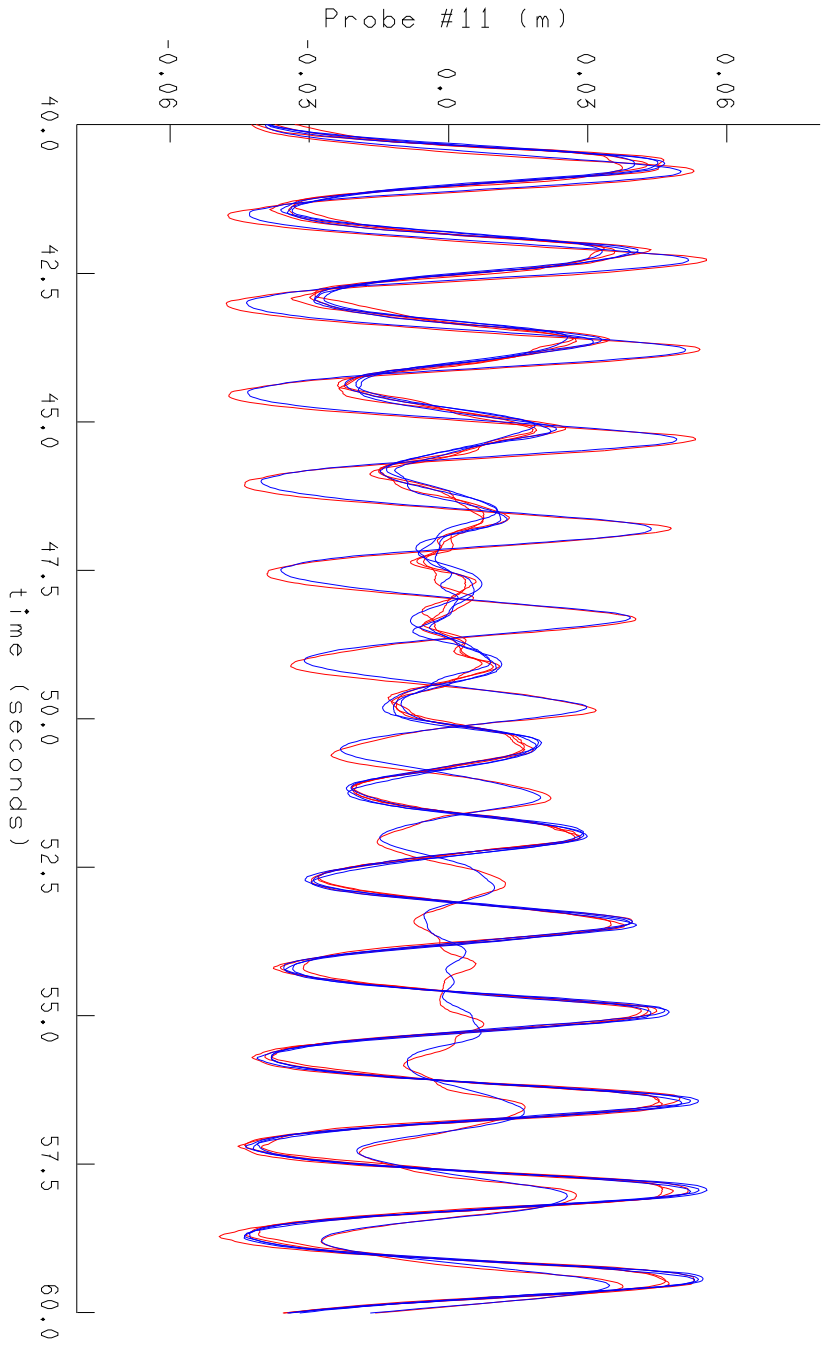

Fig. 20c: Surface elevations at Probes: 11-12-13-14
B5-2 : BIP5_H0P06_T1P55_T1P45

before after

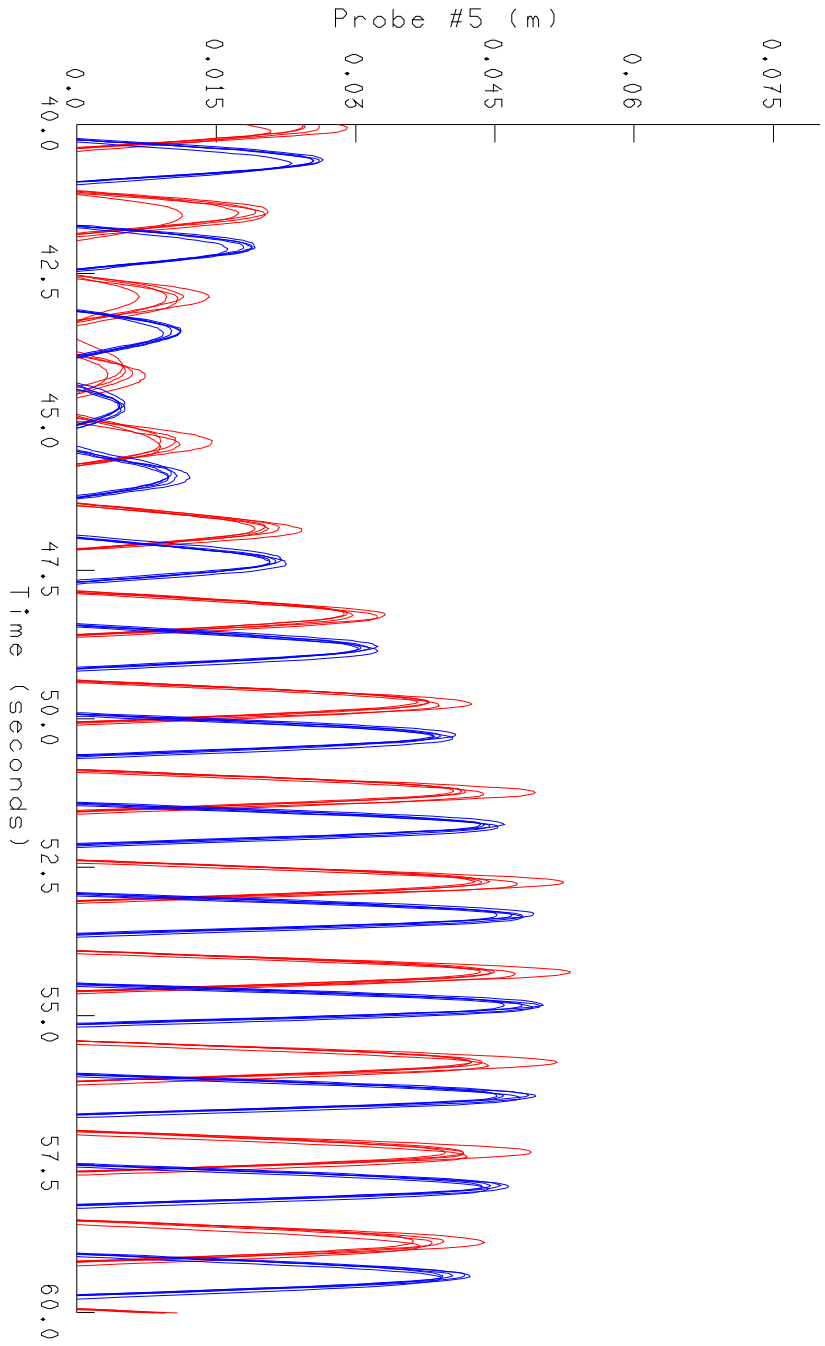

Fig. 20d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B5-2 : BIP5_H0P06_T1P55_T1P45

before after

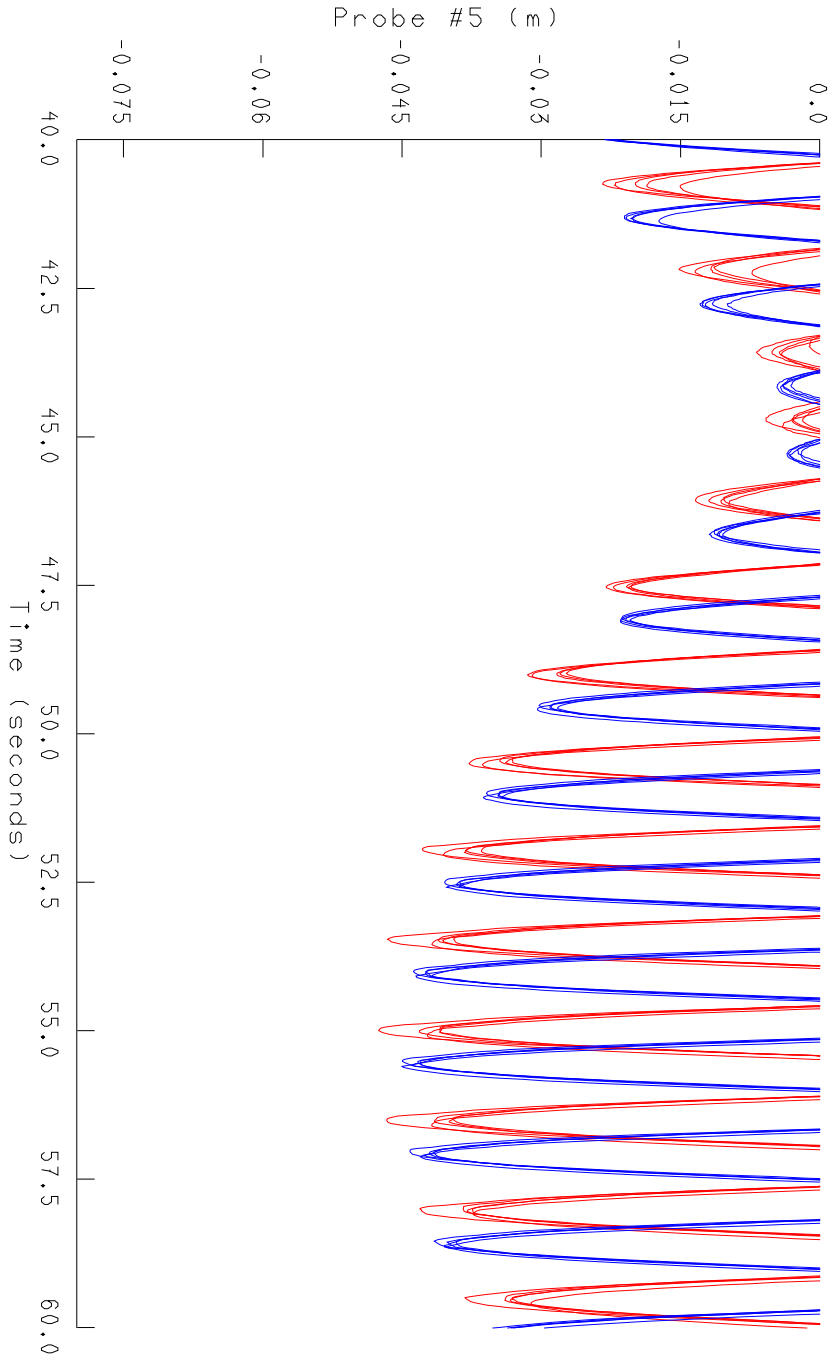

Fig. 20e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B5-2 : BIP5_H0P06_T1P55_T1P45

before after

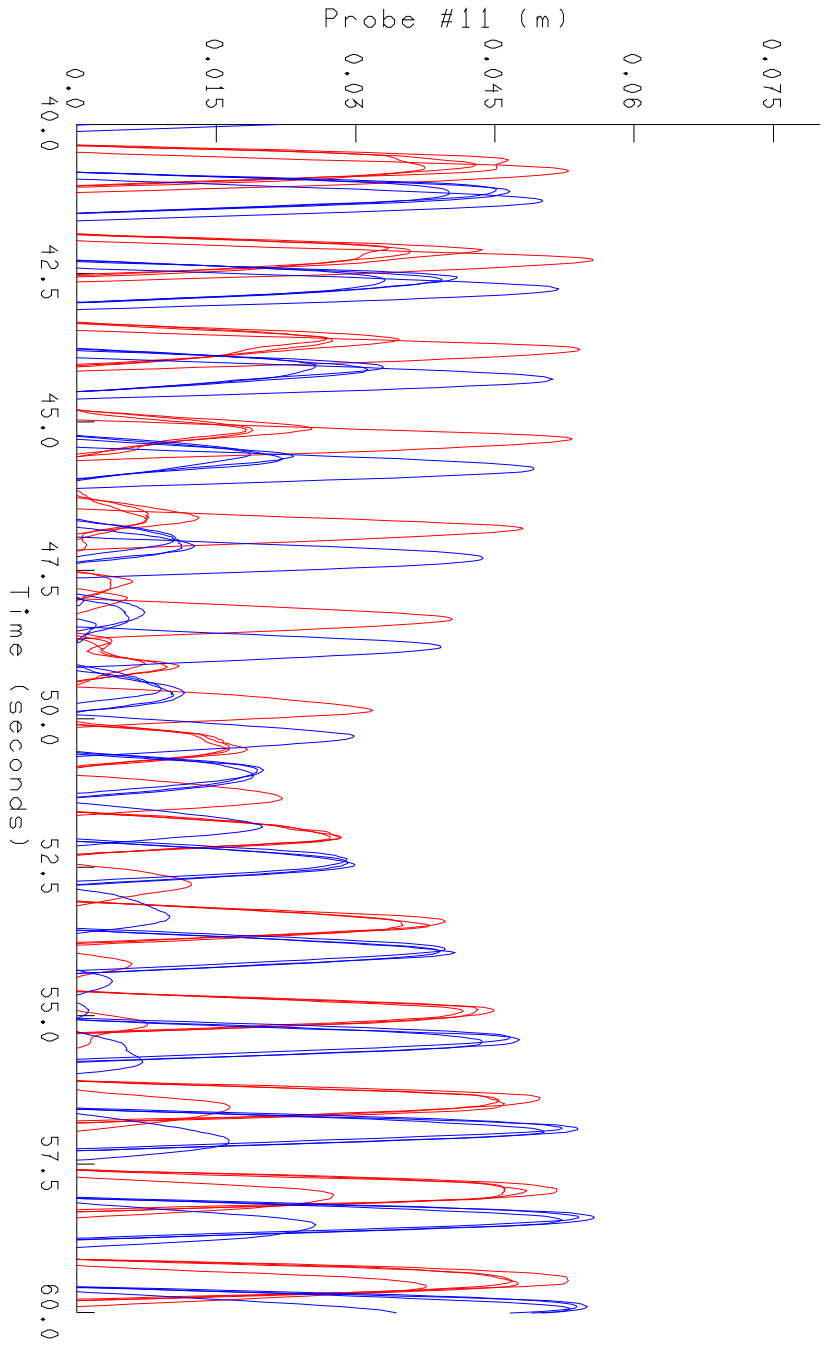

Fig. 20f: Surface elevations at Probes: 11-12-13-14 (Crest)
B5-2 : BIP5_H0P06_ T1P55_T1P45

before after

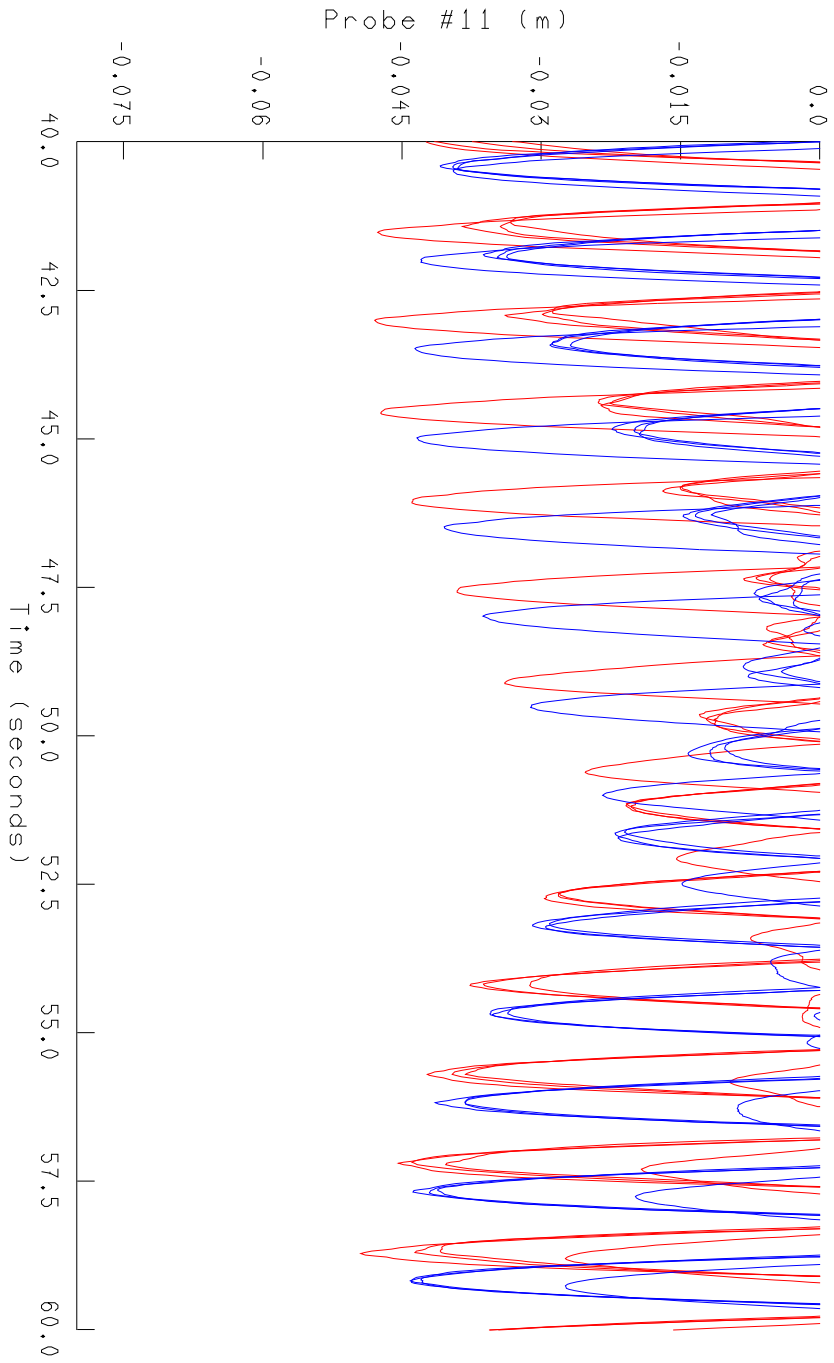

Fig. 20g: Surface elevations at Probes: 11-12-13-14 (Trough)
B5-2 : BIP5_H0P06_T2P22_T2P0

before after

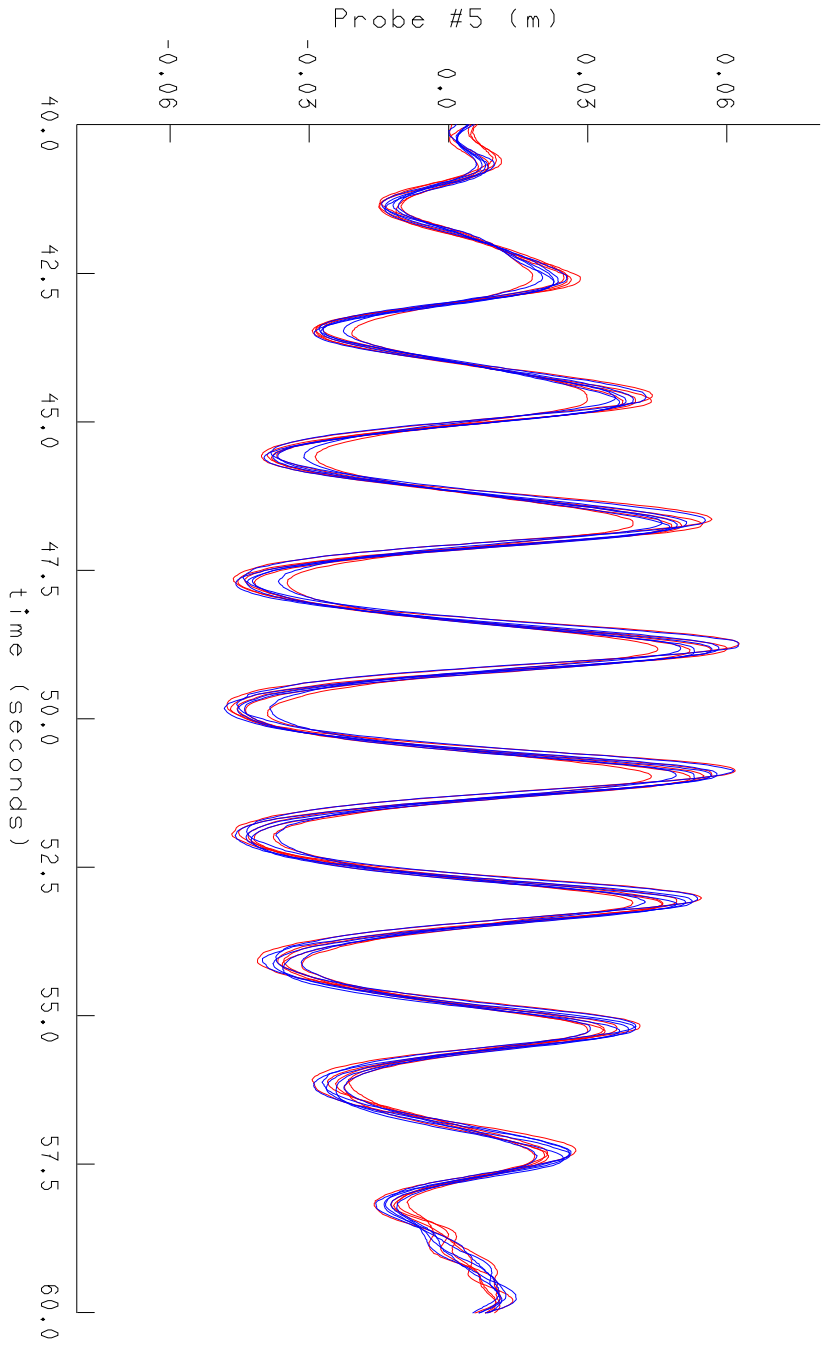

Fig. 21a: Surface elevations at Probes: 5-4-3-6-7
B5-3 : BIP5_H0P06_T2P22_T2P0

before after

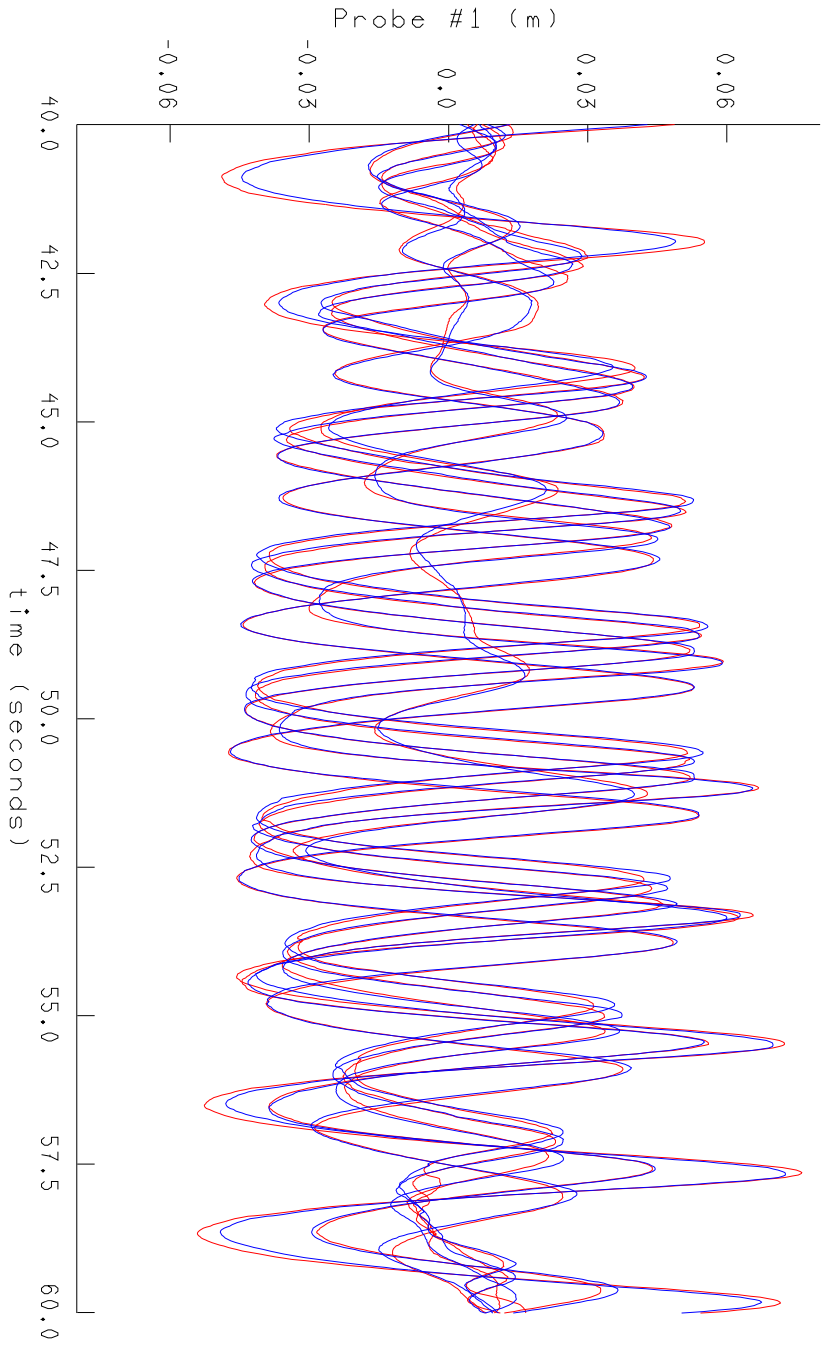

Fig. 21b: Surface elevations at Probes: 1-2-3-8-9-10
B5-3 : BIP5_H0P06_T2P22_T2P0

before after

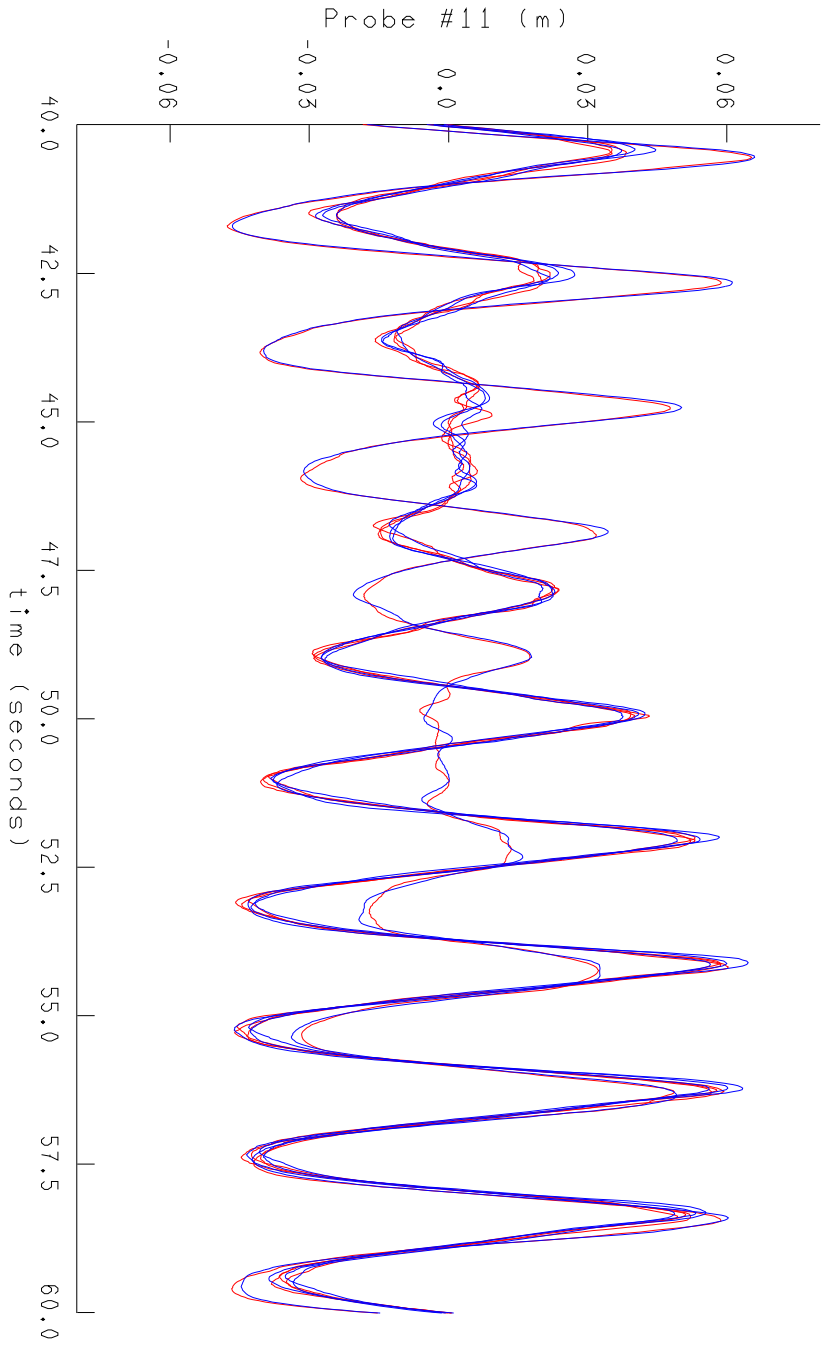

Fig. 21c: Surface elevations at Probes: 11-12-13-14
B5-3 : BIP5_H0P06_T2P22_T2P0

before after

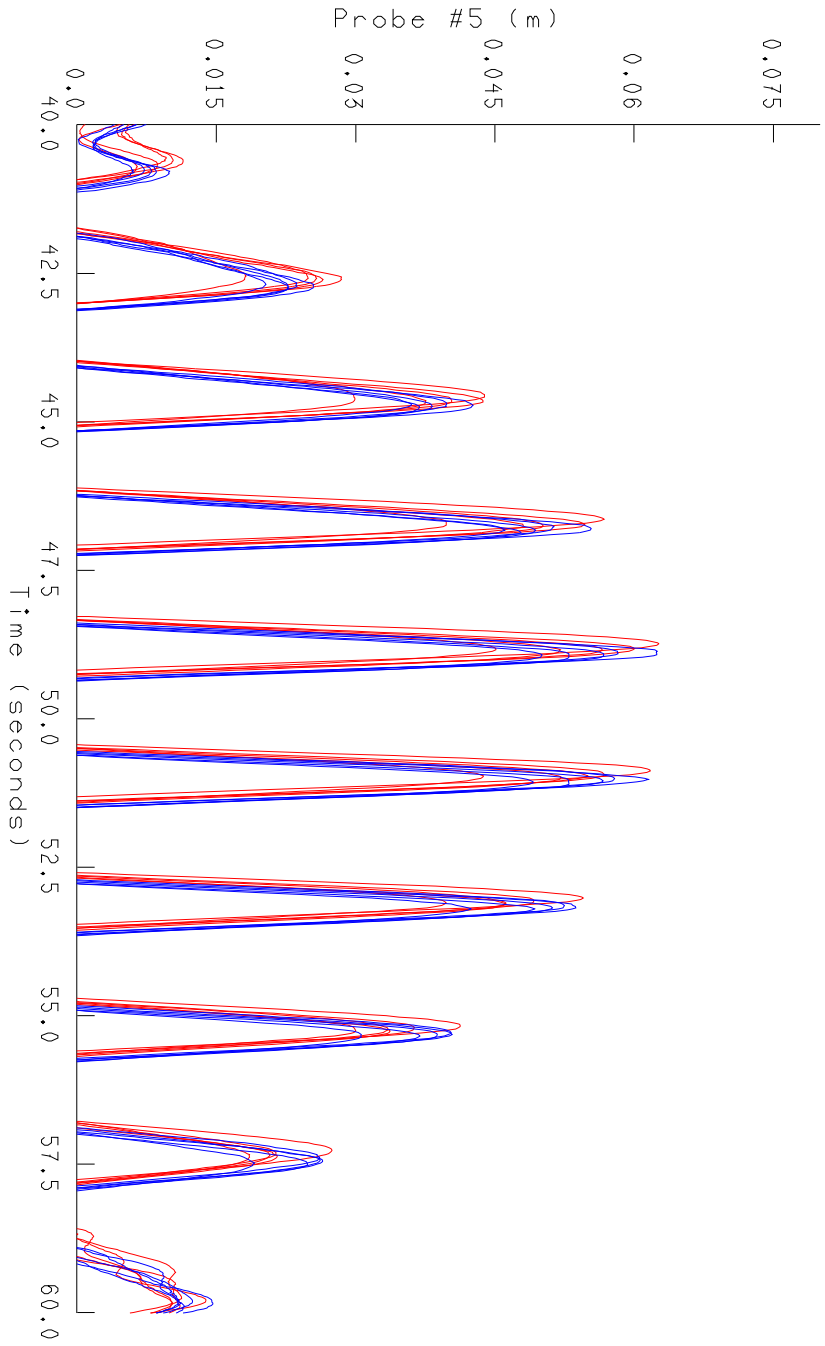

Fig. 21d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B5-3 : BIP5_H0P06_T2P22_T2P0

before after

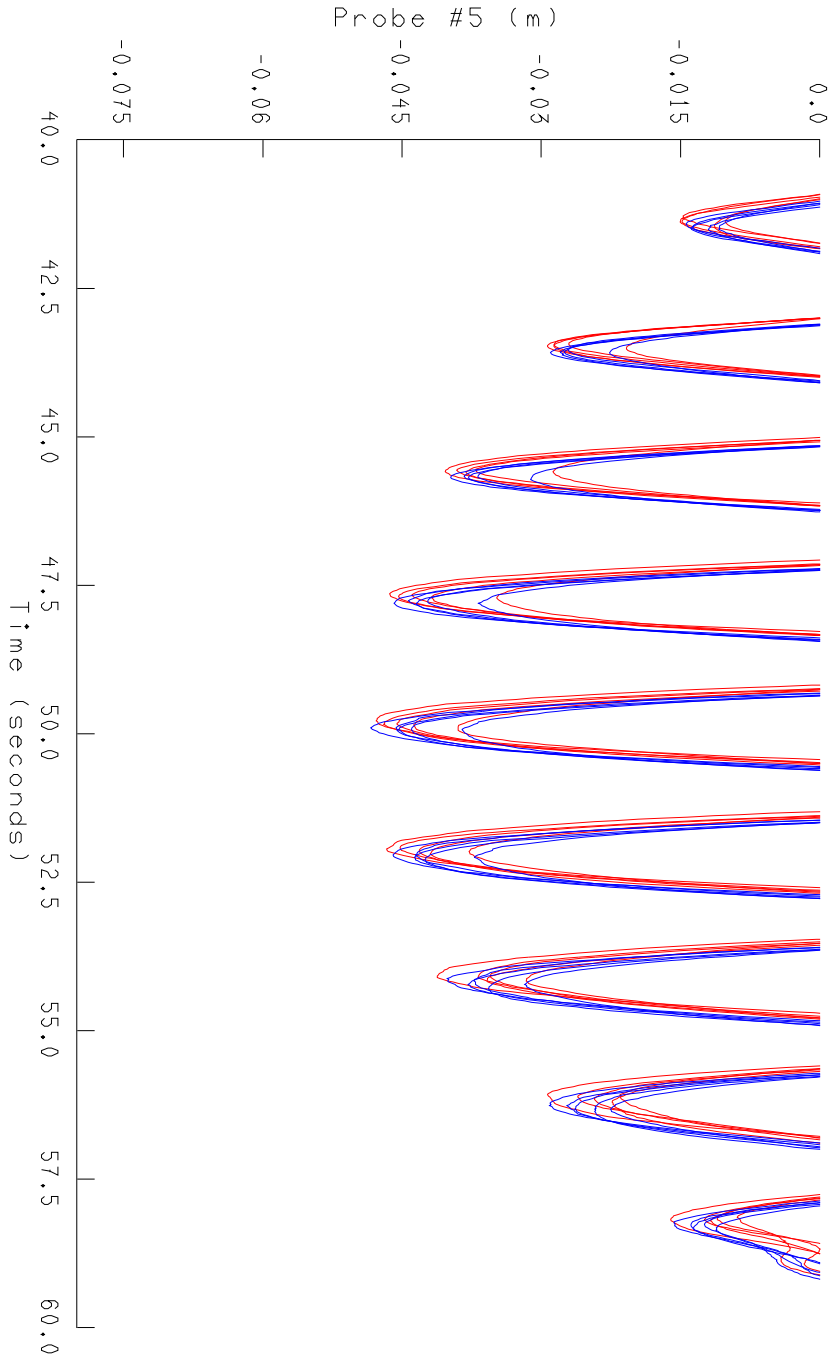

Fig. 21e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B5-3 : BIP5_H0P06_T2P22_T2P0

before after

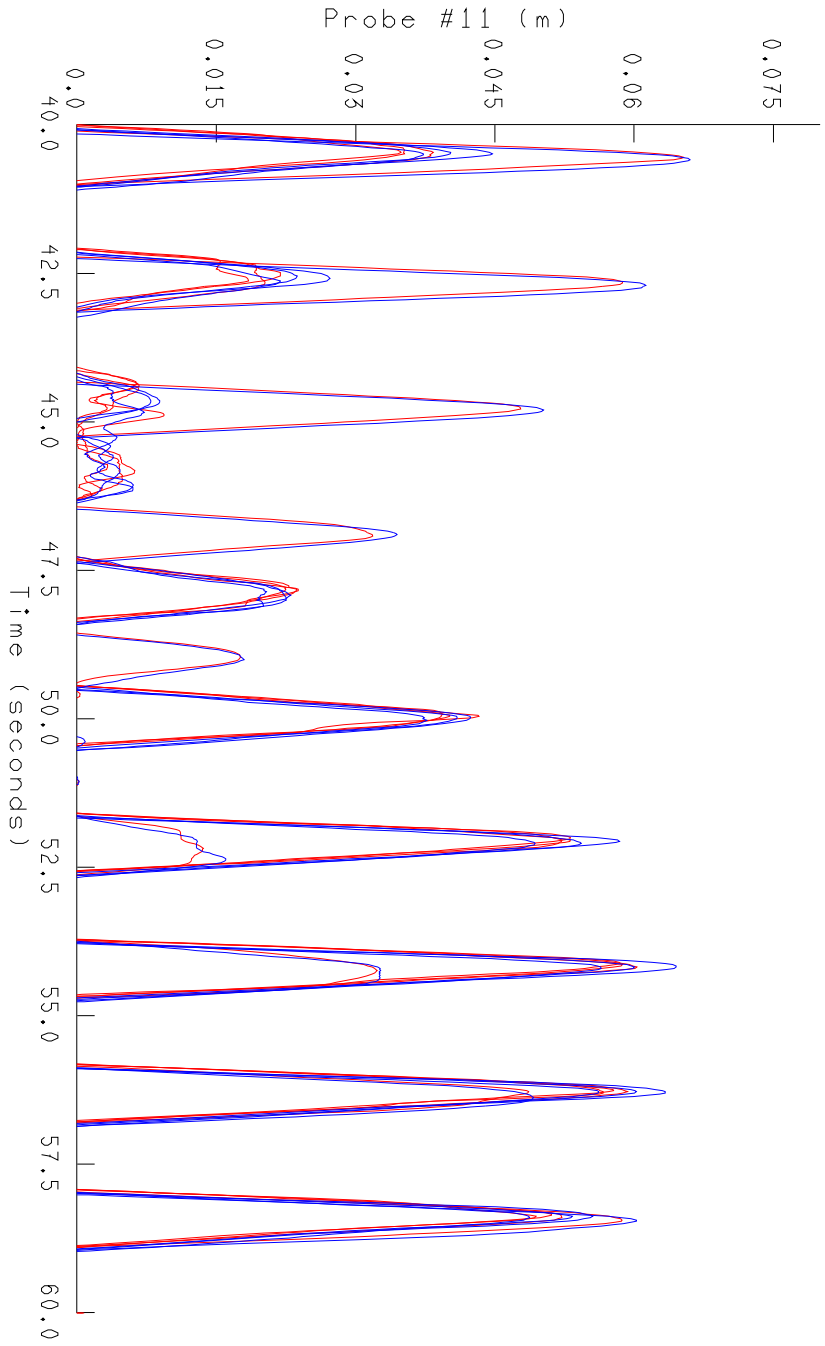

Fig. 21f: Surface elevations at Probes: 11-12-13-14 (Crest)
B5-3 : BIP5_H0P06_T2P22_T2P0

before after

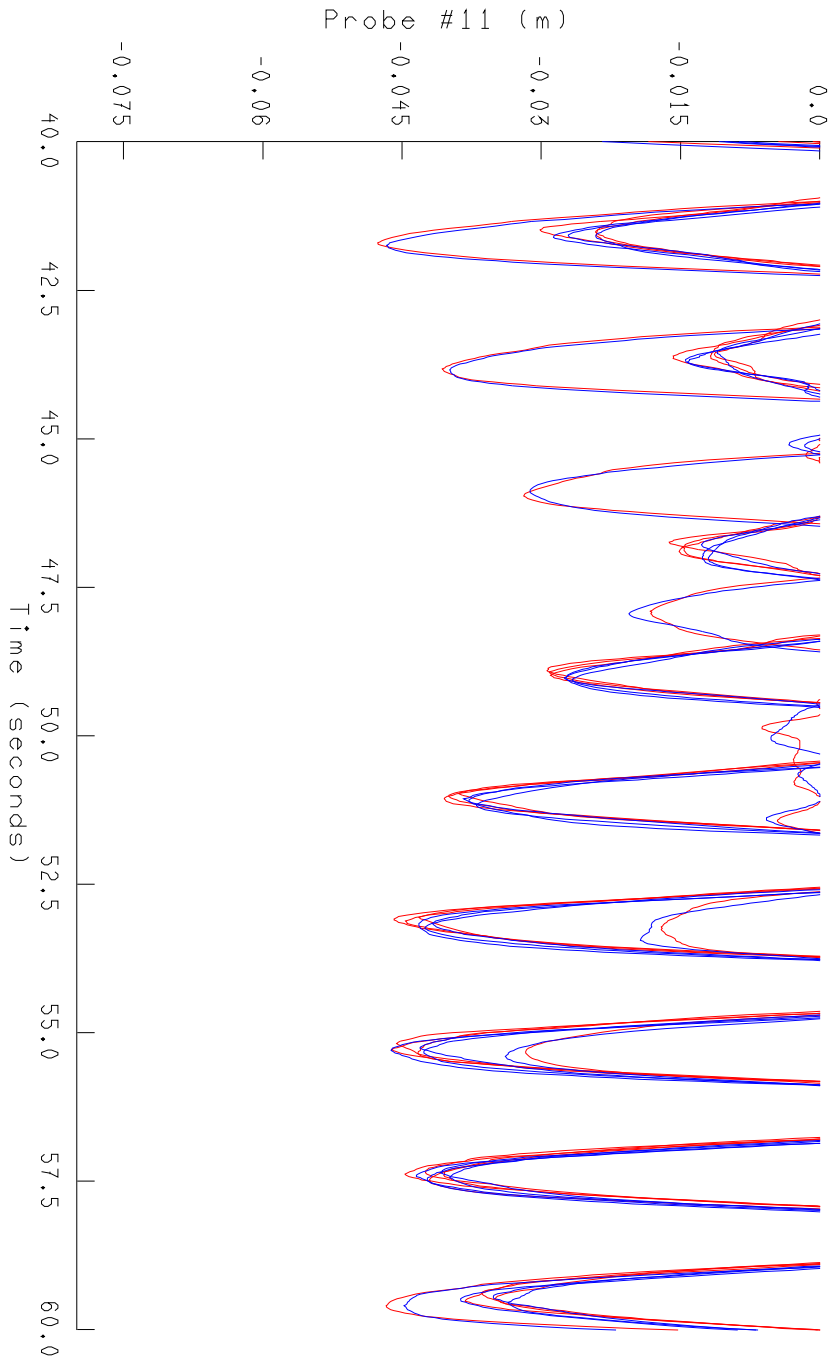

Fig. 21g: Surface elevations at Probes: 11-12-13-14 (Trough)
B5-3 : BIP5_H0P06_T2P22_T2P0

before after

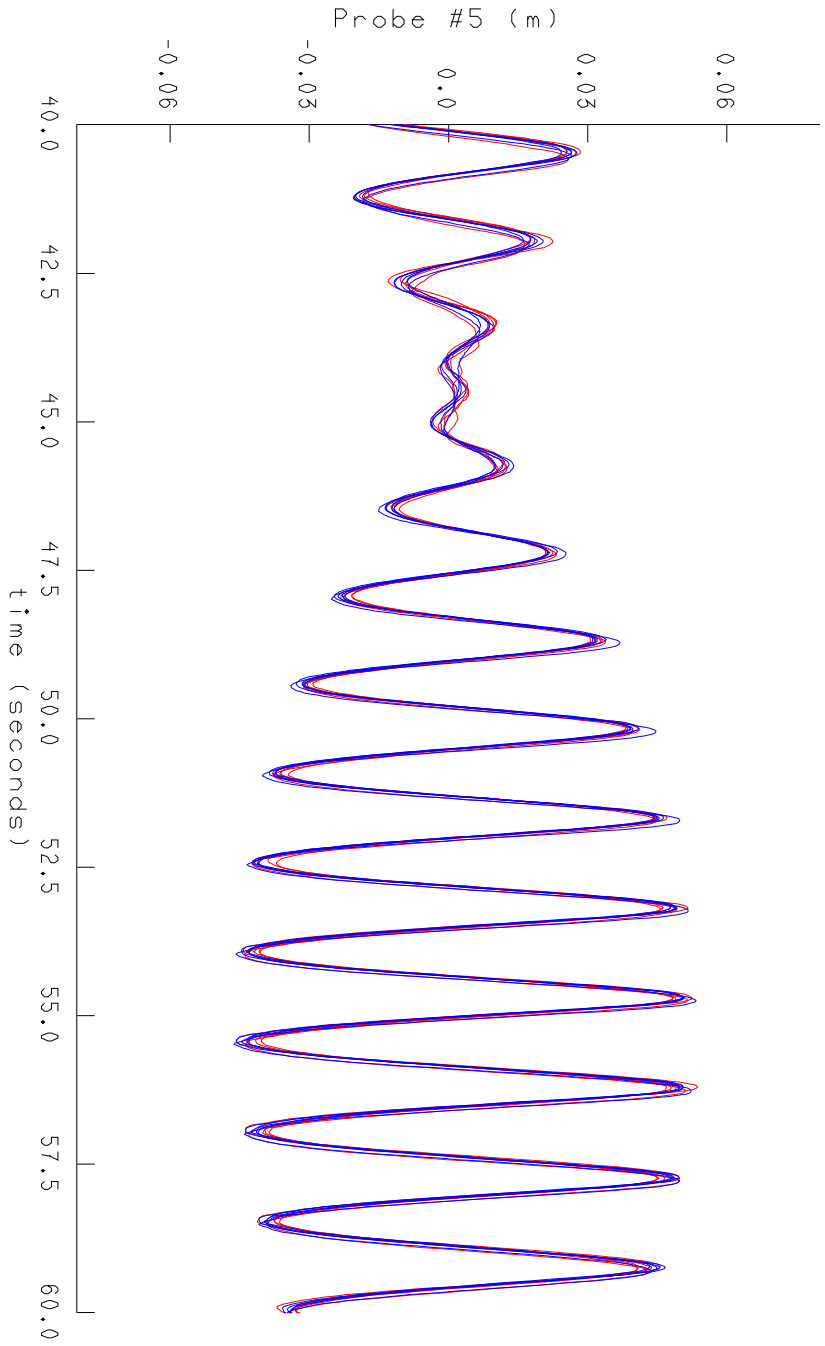

Fig. 22a: Surface elevations at Probes: 5-4-3-6-7
B6-2 : BIP6_H0P06_ T1P55_T1P45

before after

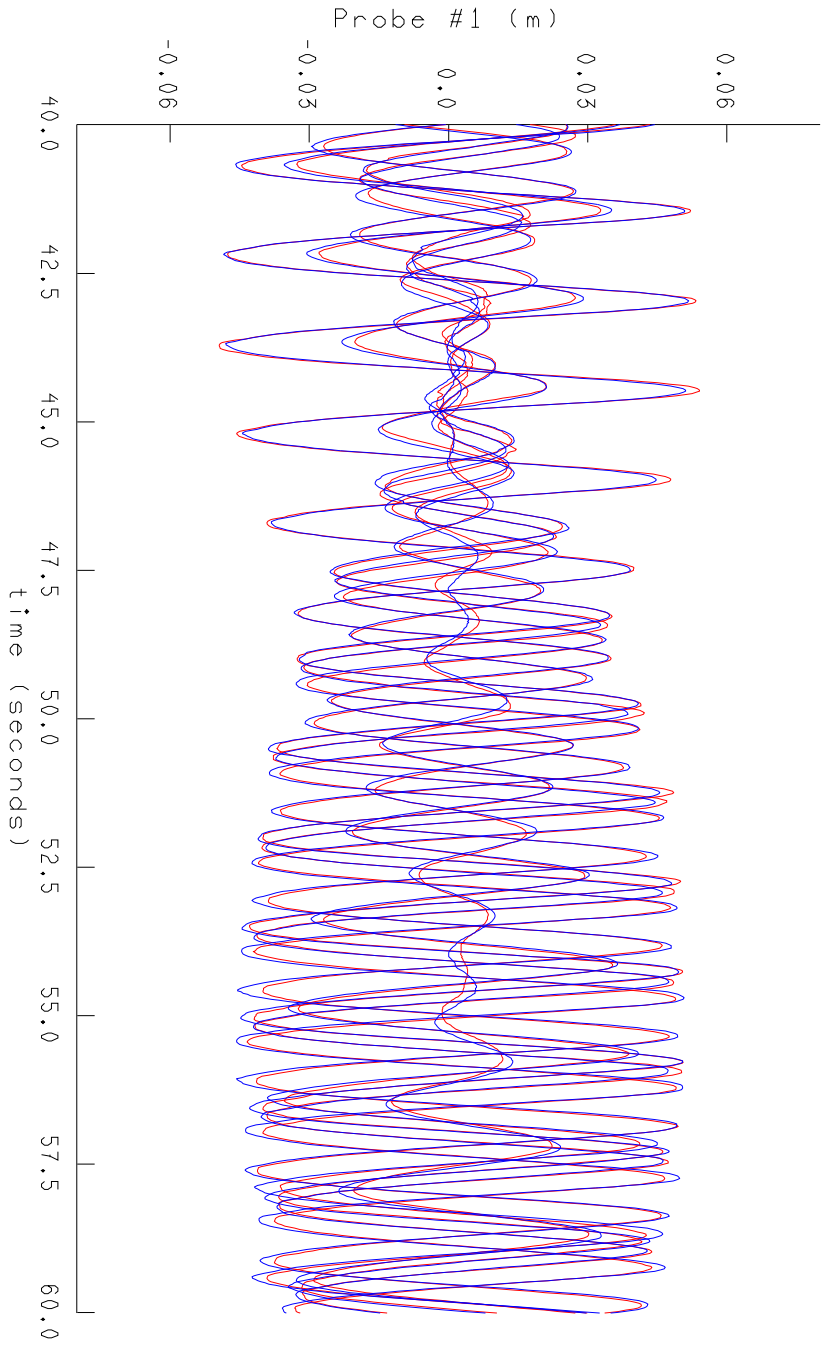

Fig. 22b: Surface elevations at Probes: 1-2-3-8-9-10
B6-2 : BIP6_H0P06_ T1P55_T1P45

before after

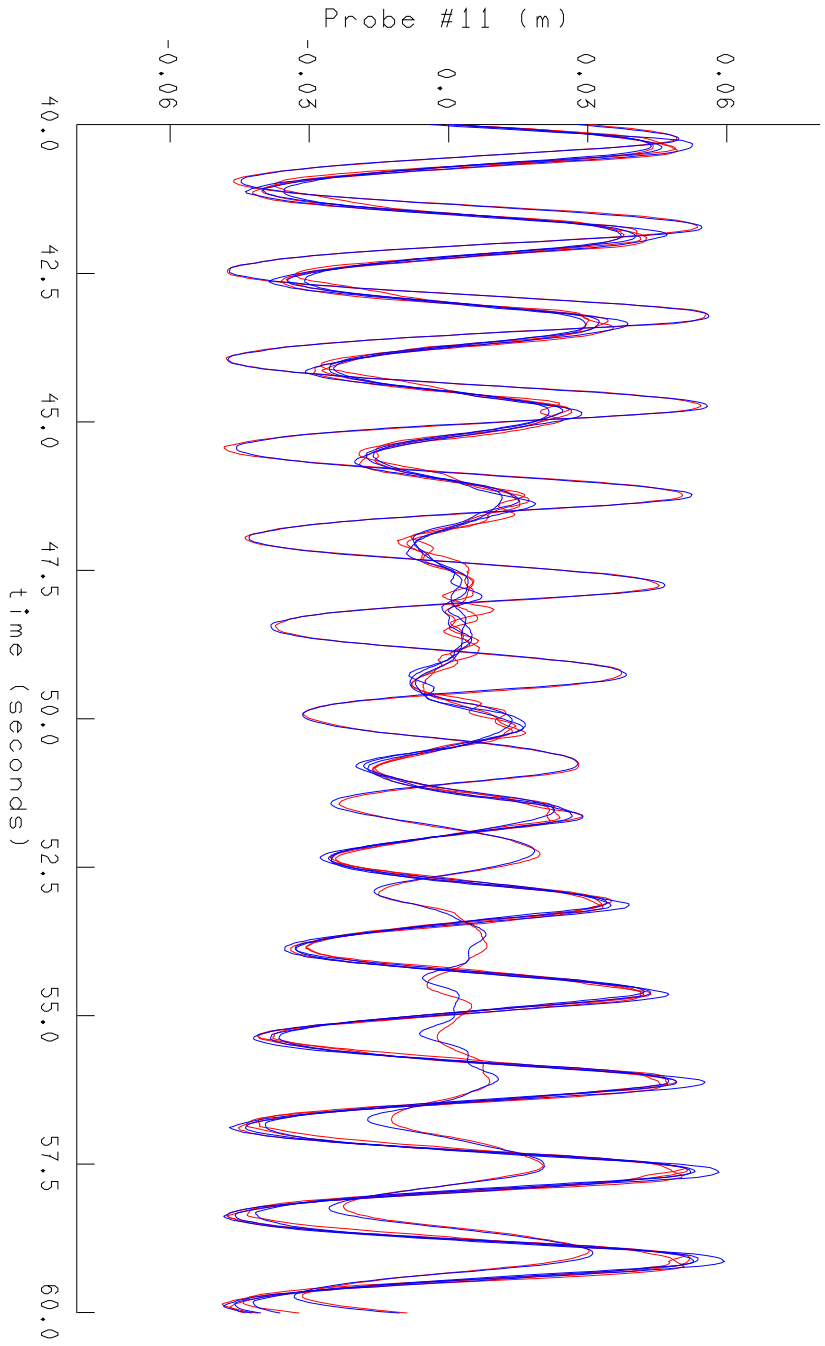

Fig. 22c: Surface elevations at Probes: 11-12-13-14
B6-2 : BIP6_H0P06_ T1P55_T1P45

before after

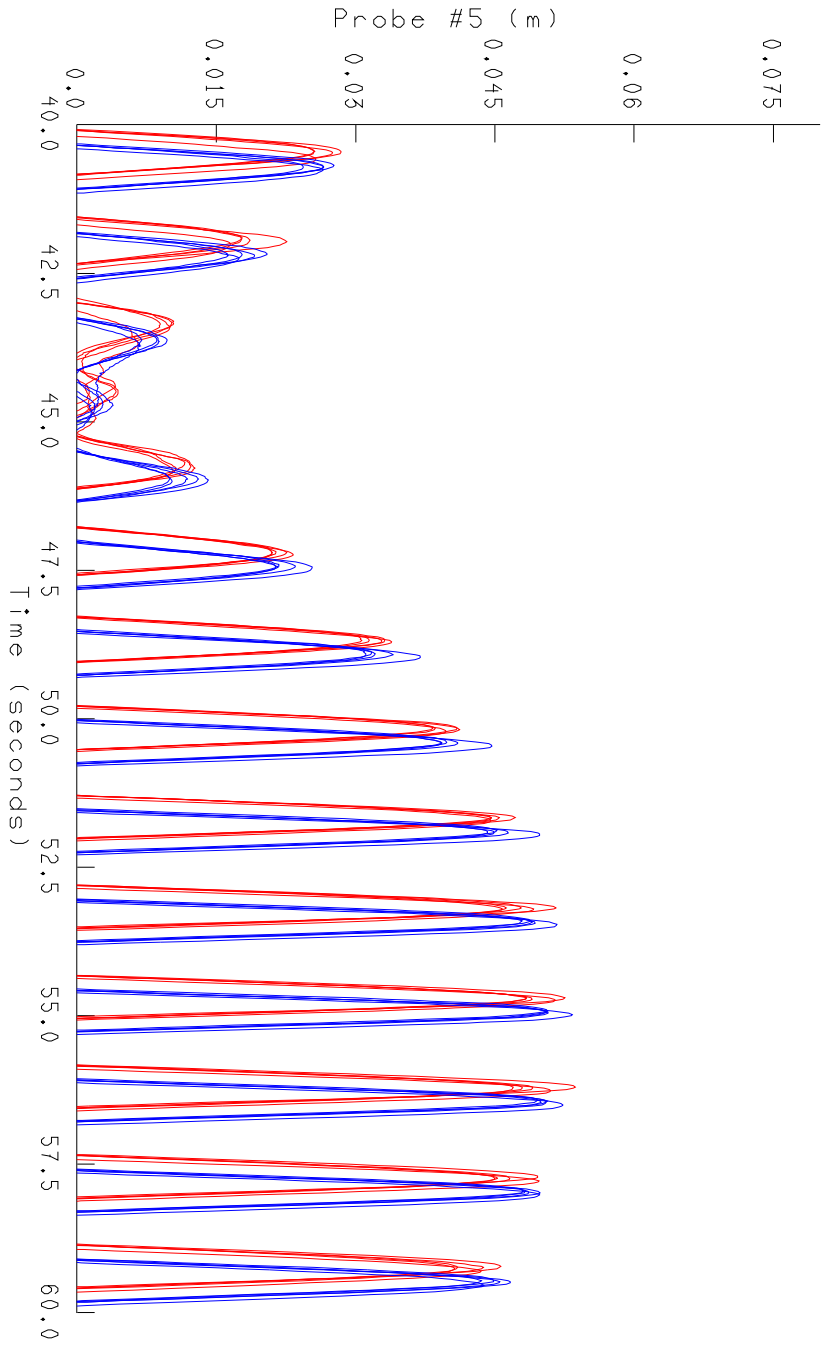

Fig. 22d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B6-2 : BIP6_H0P06_ T1P55_T1P45

before after

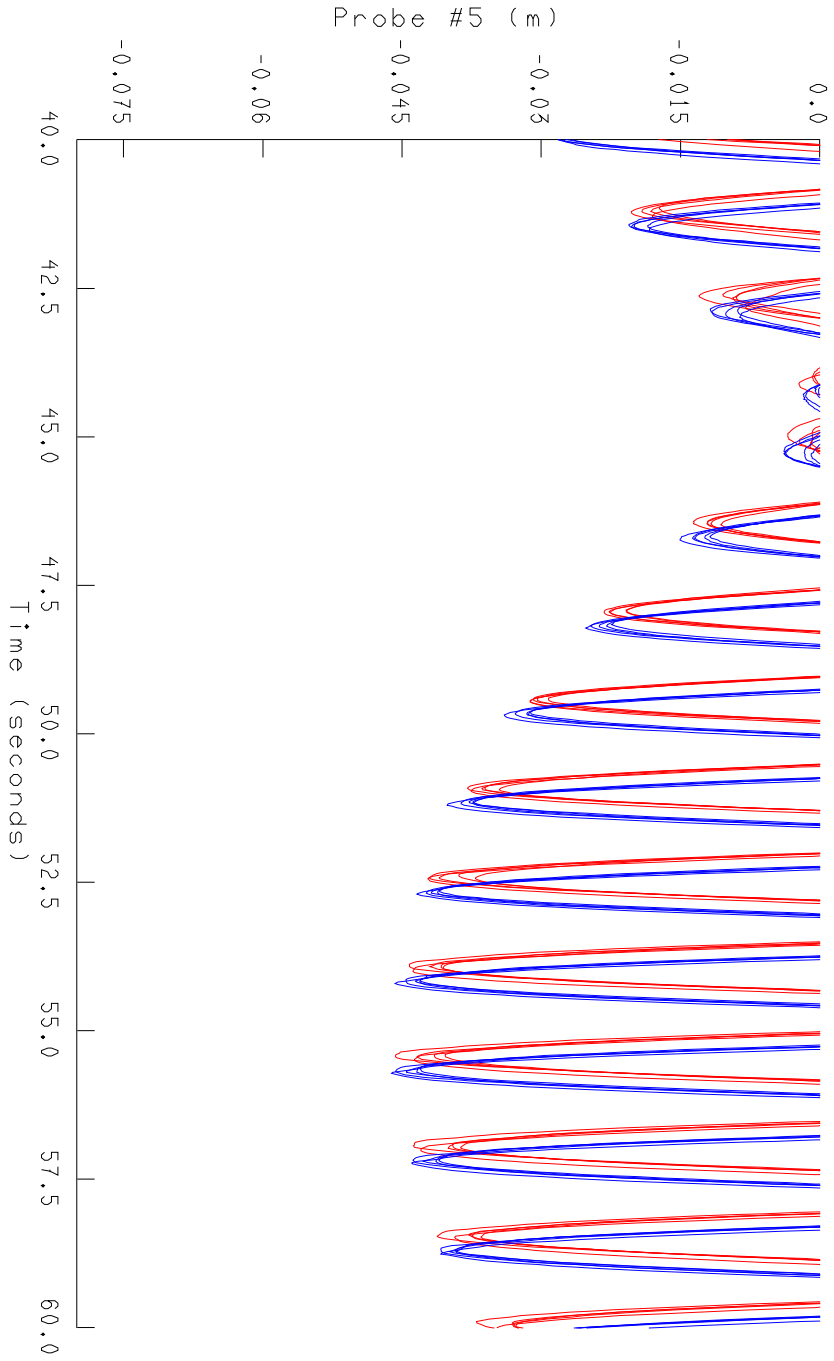

Fig. 22e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B6-2 : BIP6_H0P06_ T1P55_T1P45

before after

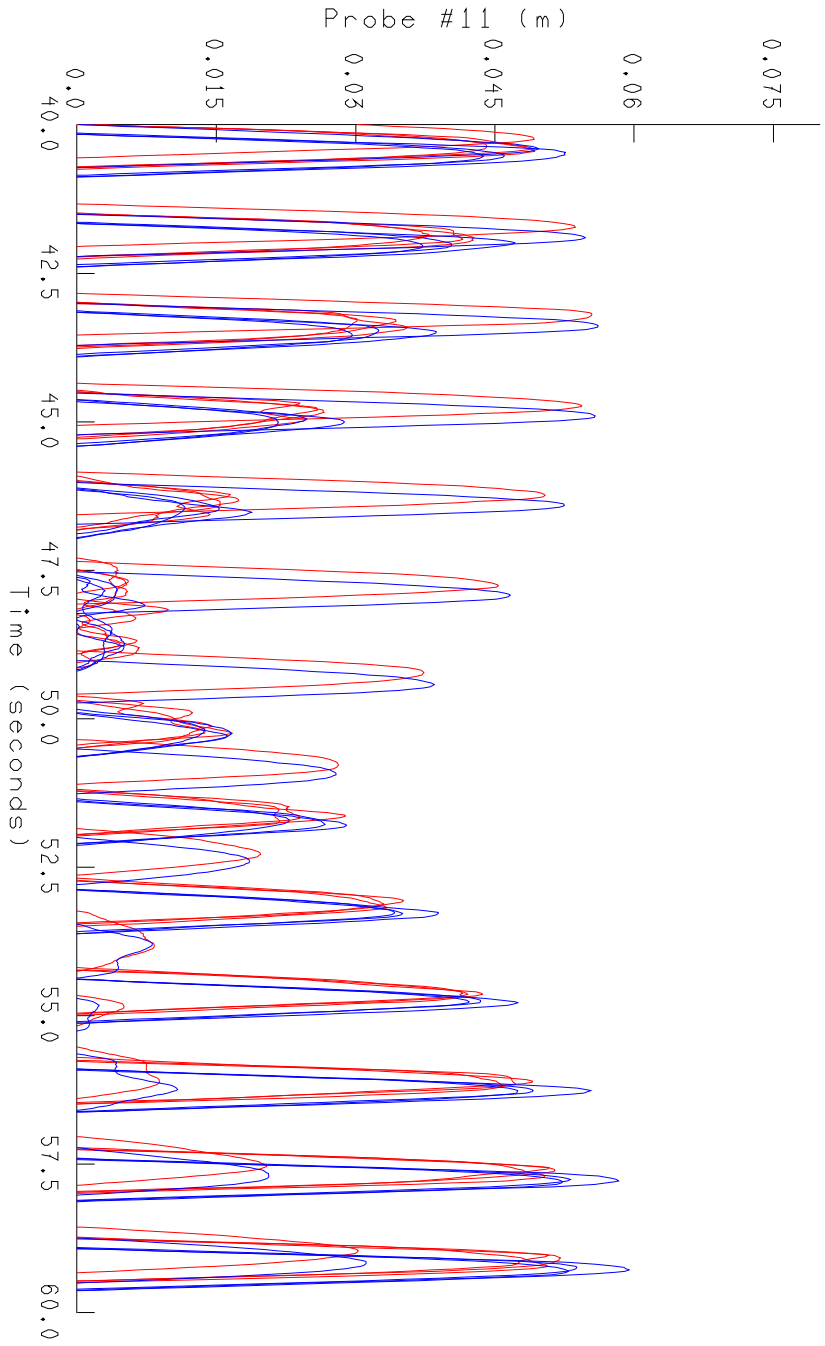

Fig. 22f: Surface elevations at Probes: 11-12-13-14 (Crest)
B6-2 : BIP6_H0P06_ T1P55_T1P45

before after

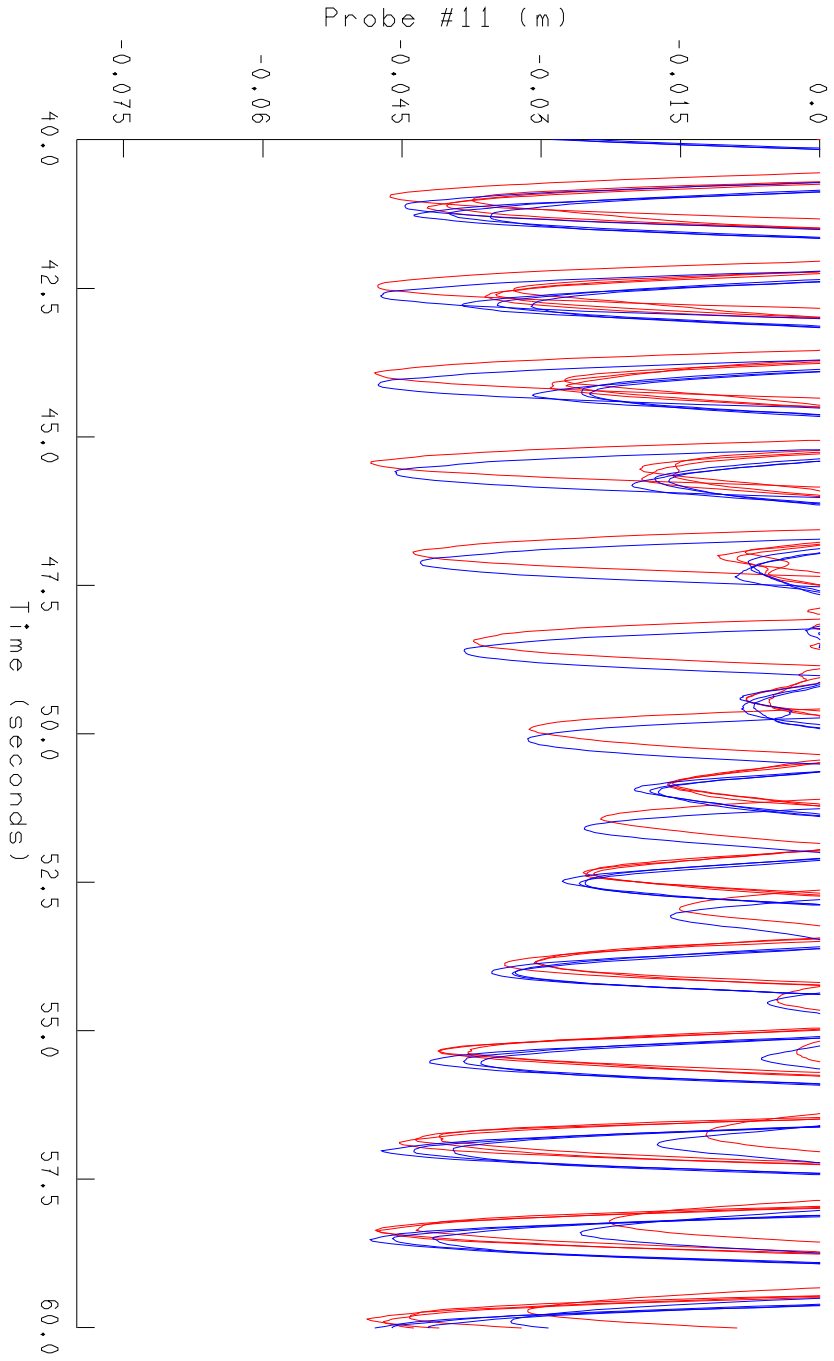

Fig. 22g: Surface elevations at Probes: 11-12-13-14 (Trough)
B6-2 : BIP6_H0P06_T2P22_T2P0

before after

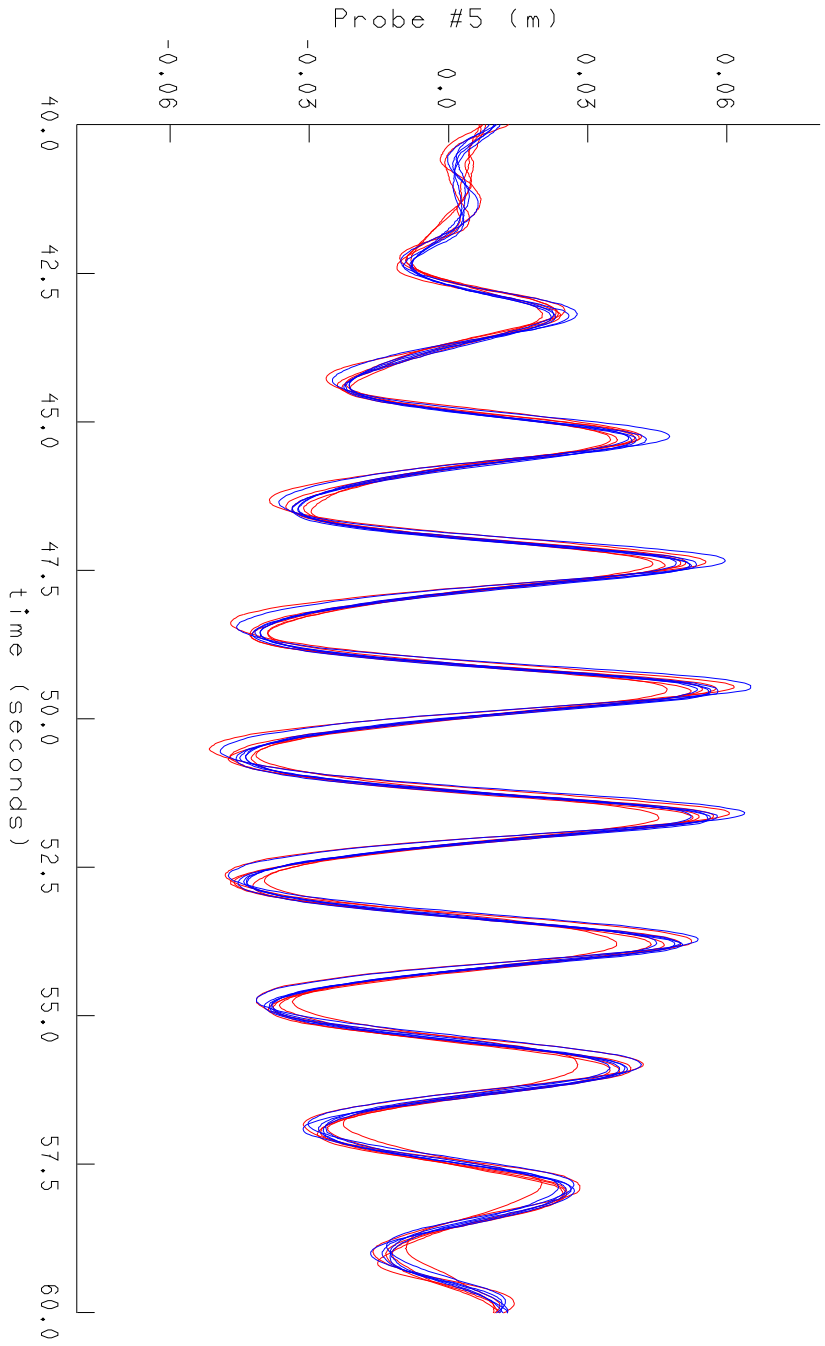

Fig. 23a: Surface elevations at Probes: 5-4-3-6-7
B6-3 : BIP6_H0P06_ T2P22_T2P0

before after

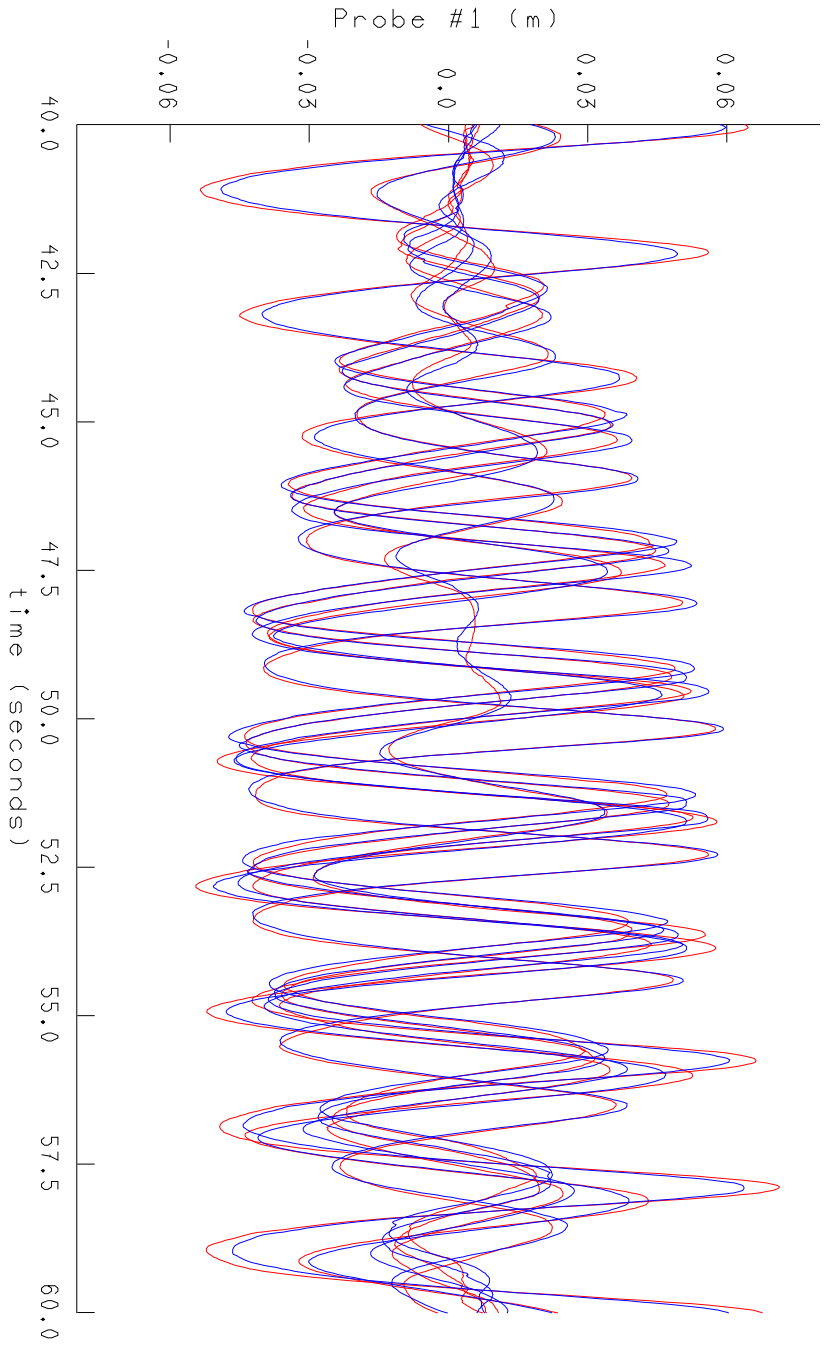

Fig. 23b: Surface elevations at Probes: 1-2-3-8-9-10
B6-3 : BIP6_H0P06_ T2P22_T2P0

before after

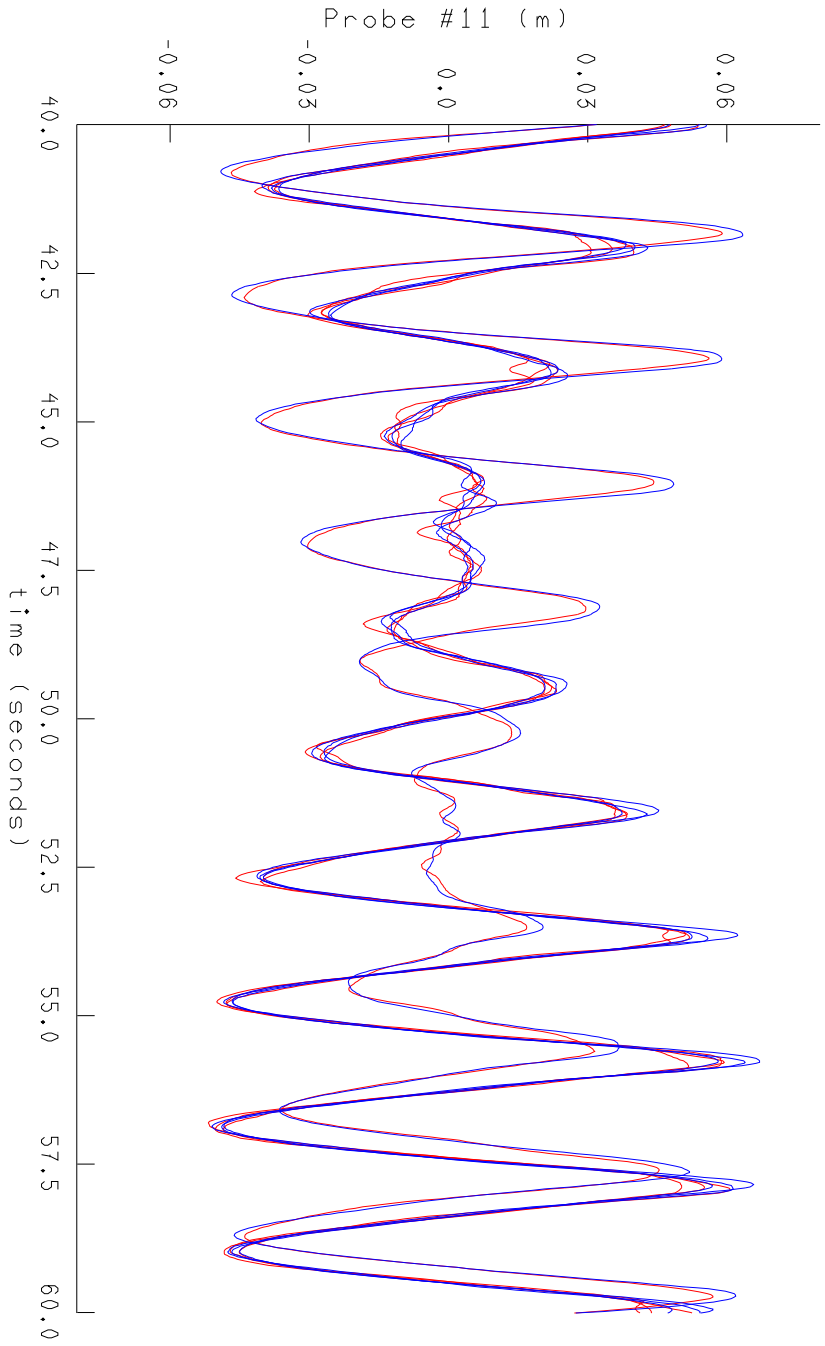

Fig. 23c: Surface elevations at Probes: X, 12, 13, 14
B6-3 : BIP6_H0P06_ T2P22_T2P0

before after

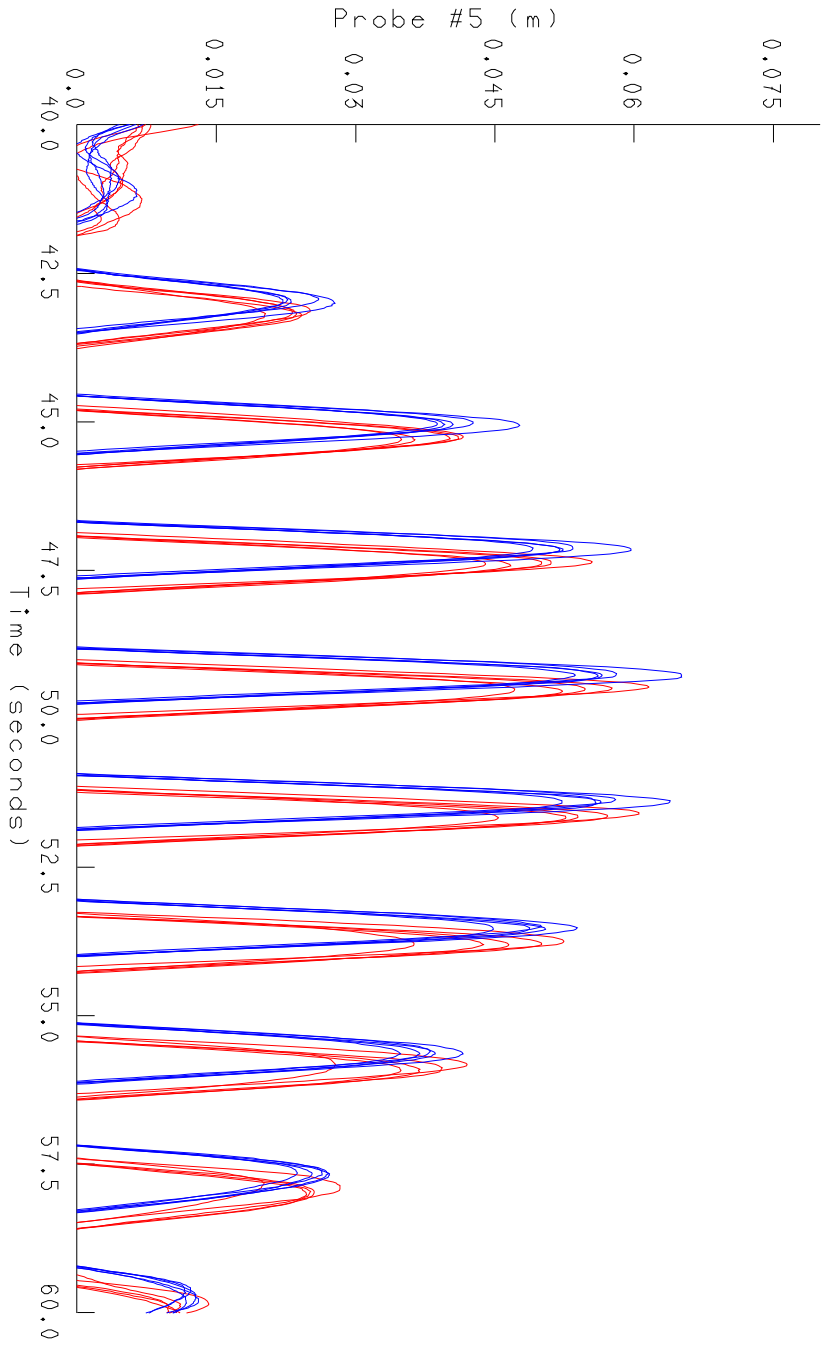

Fig. 23d: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B6-3 : BIP6_H0P06_ T2P22_T2P0

before after

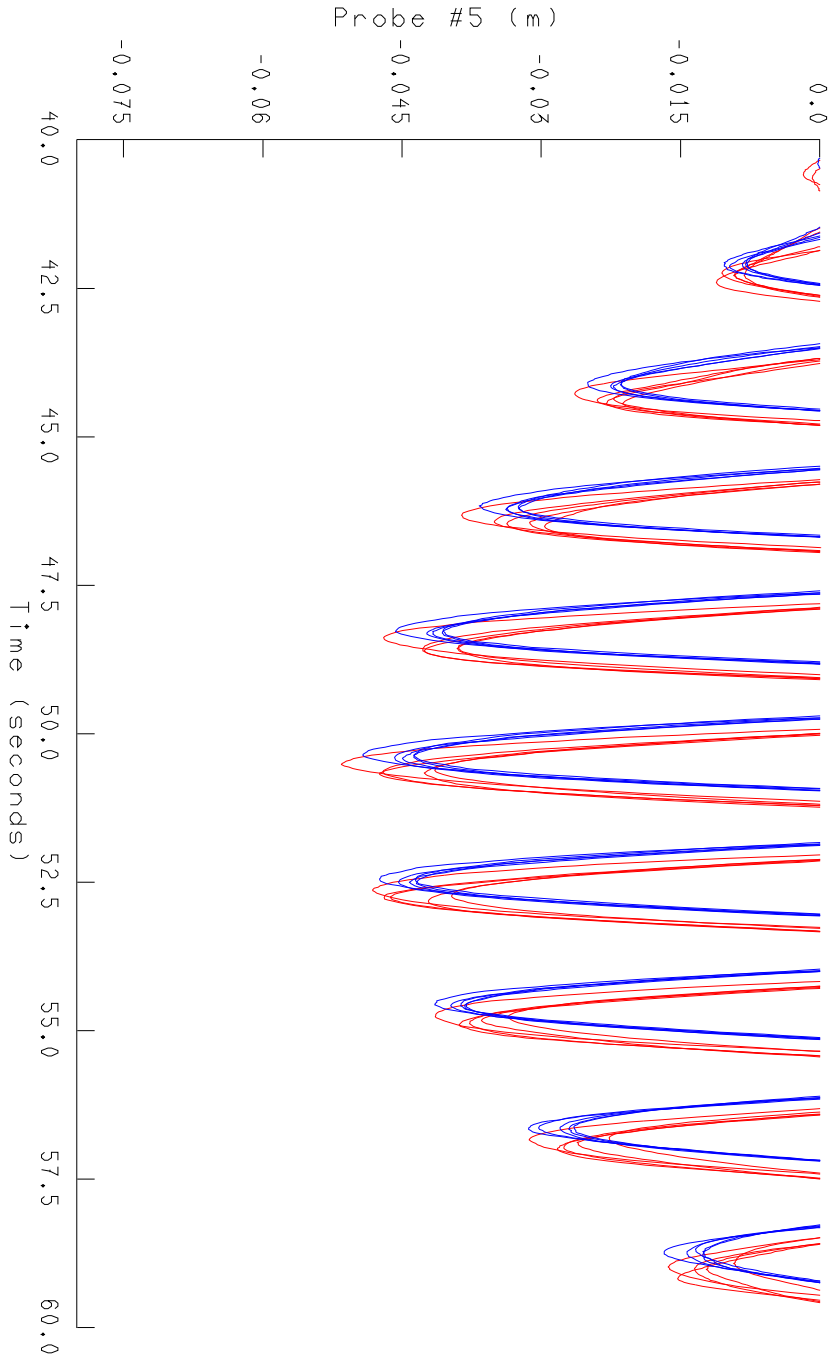

Fig. 23e: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B6-3 : BIP6_H0P06_ T2P22_T2P0

before after

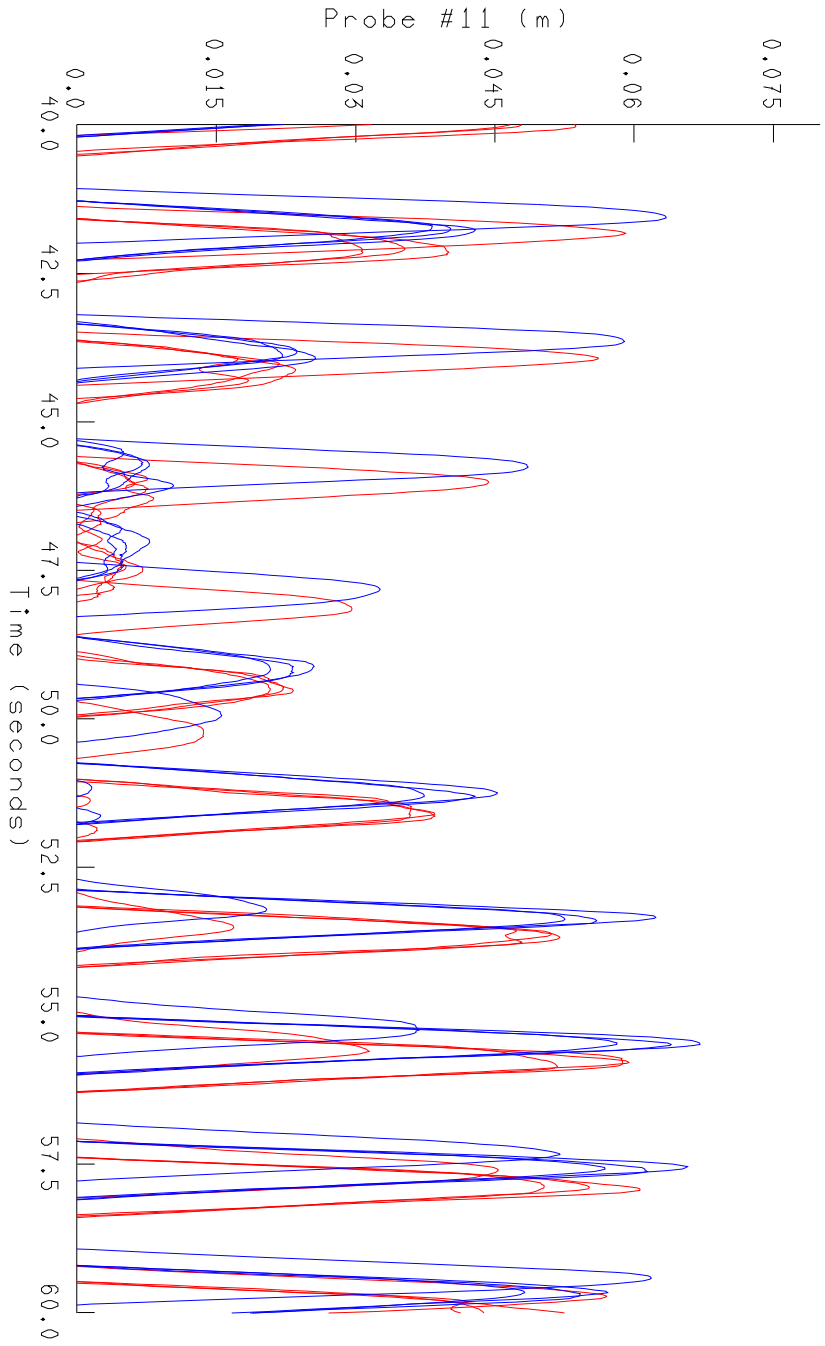

Fig. 23f: Surface elevations at Probes: 11-12-13-14 (Crest)
B6-3 : BIP6_H0P06_ T2P22_T2P0

before after

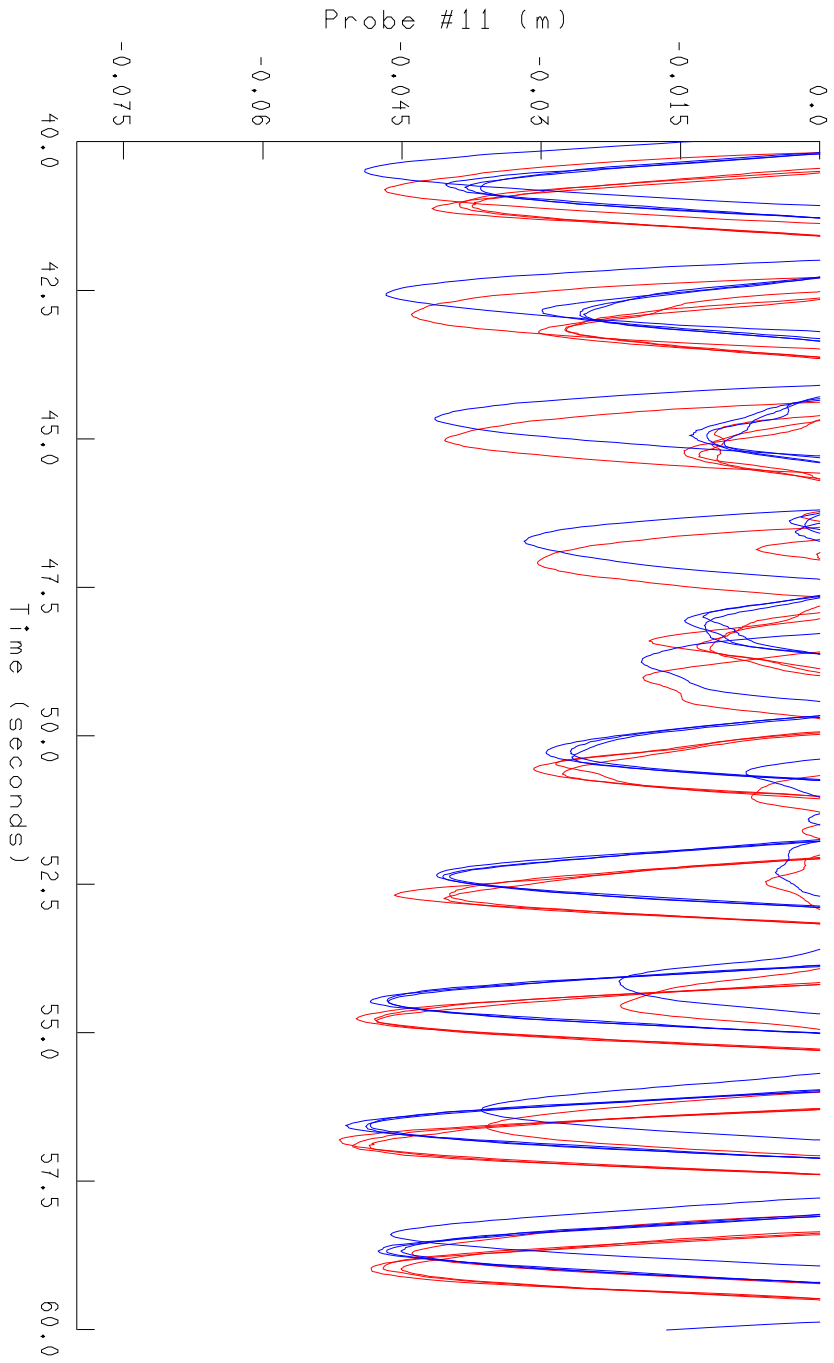

Fig. 23g: Surface elevations at Probes: 11-12-13-14 (Trough)
B6-3 : BIP6_H0P06_ T2P22_T2P0

before after

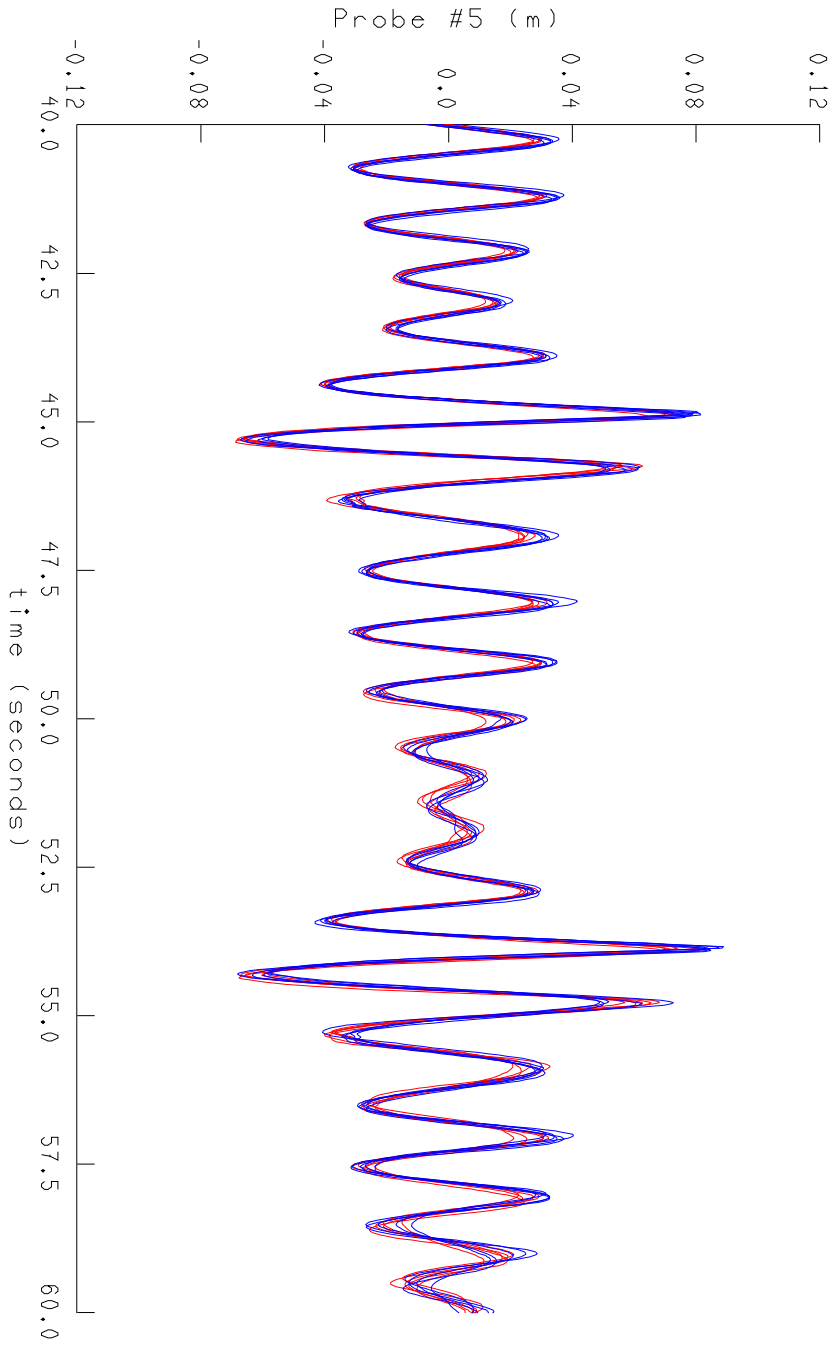

Fig. 24a: Surface elevations at Probes: 5-4-3-6-7
B8-1 : BIP8_H0P06_T1P0_T0P9

before after

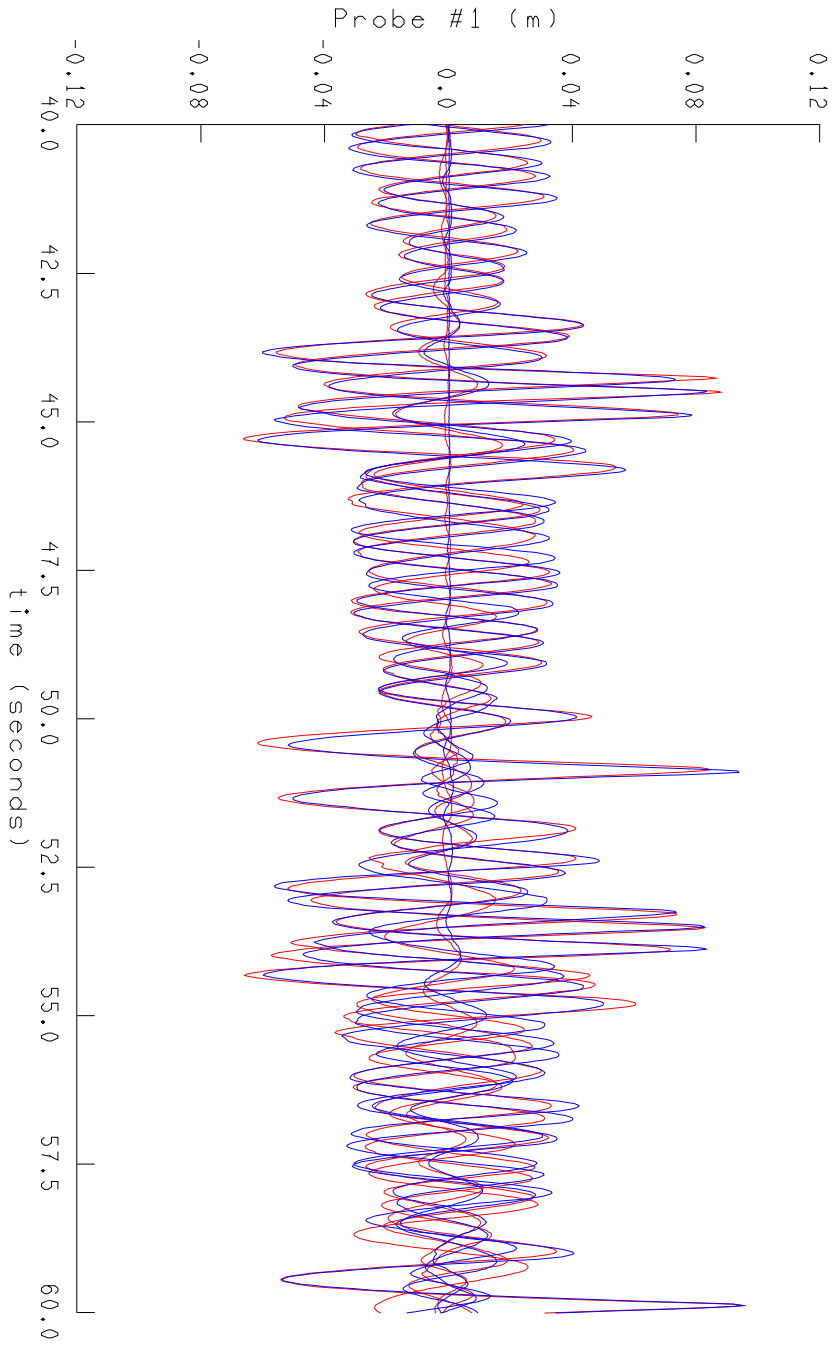

Fig. 24b: Surface elevations at Probes: 1-2-3-8-9
B8-1 : BIP8_H0P06_T1P0_T0P9

before after

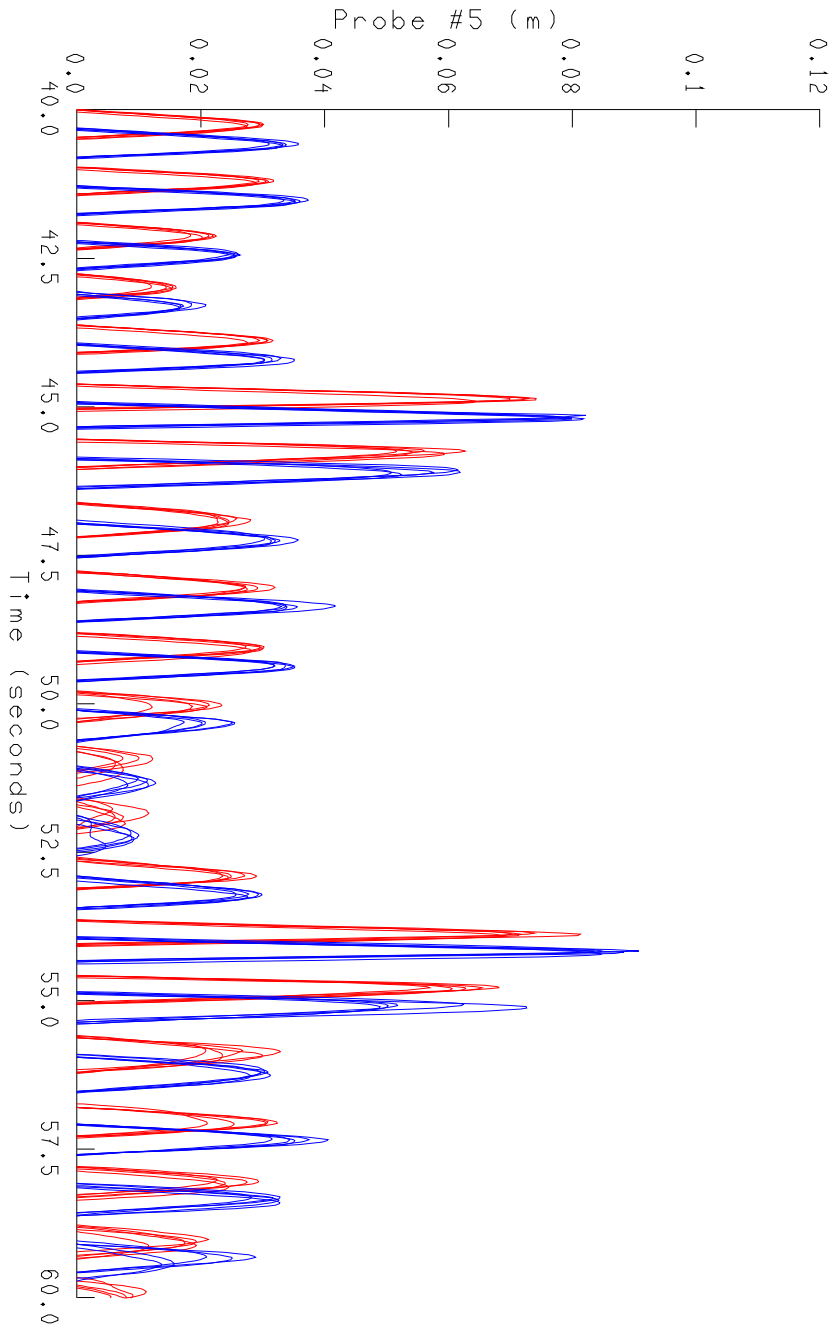

Fig. 24c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B8-1 : BIP8_H0P06_T1P0_T0P9

before after

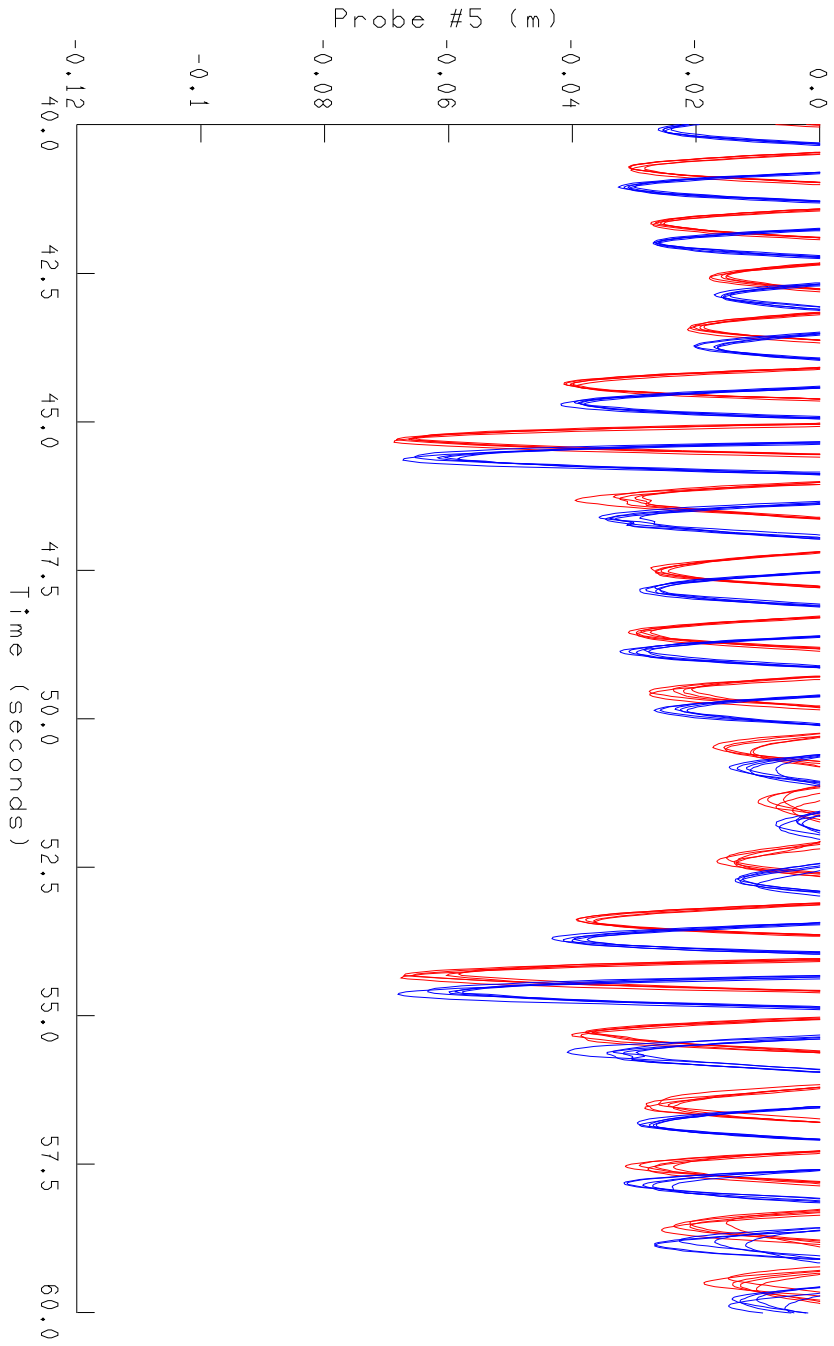

Fig. 24d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B8-1 : BIP8_H0P06_T1P0_T0P9

before after

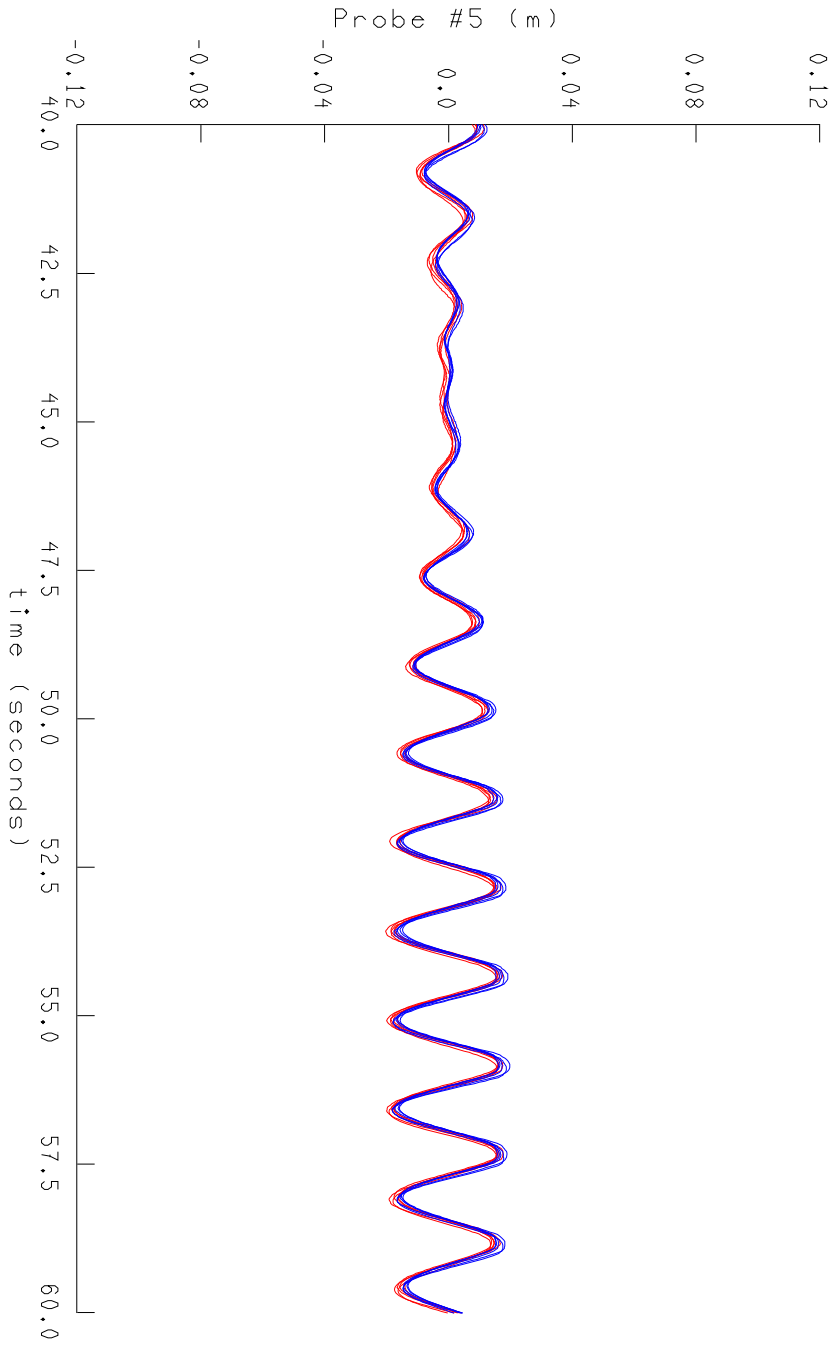

Fig. 25a: Surface elevations at Probes: 5-4-3-6-7
B8-2 : BIP8_H0P02_T1P55_T1P45

before after

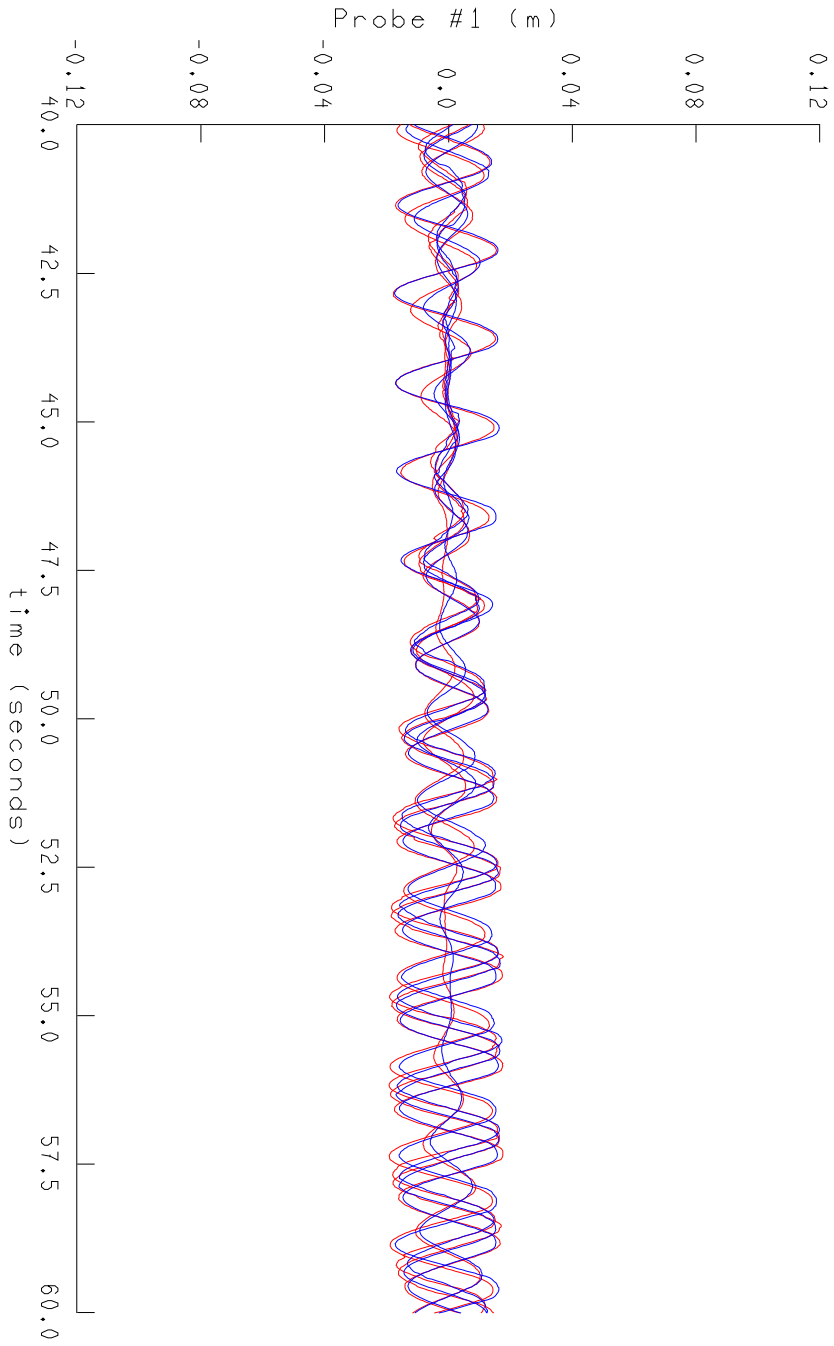

Fig. 25b: Surface elevations at Probes: 1-2-3-8-9
B8-2 : BIP8_H0P02_T1P55_T1P45

before after

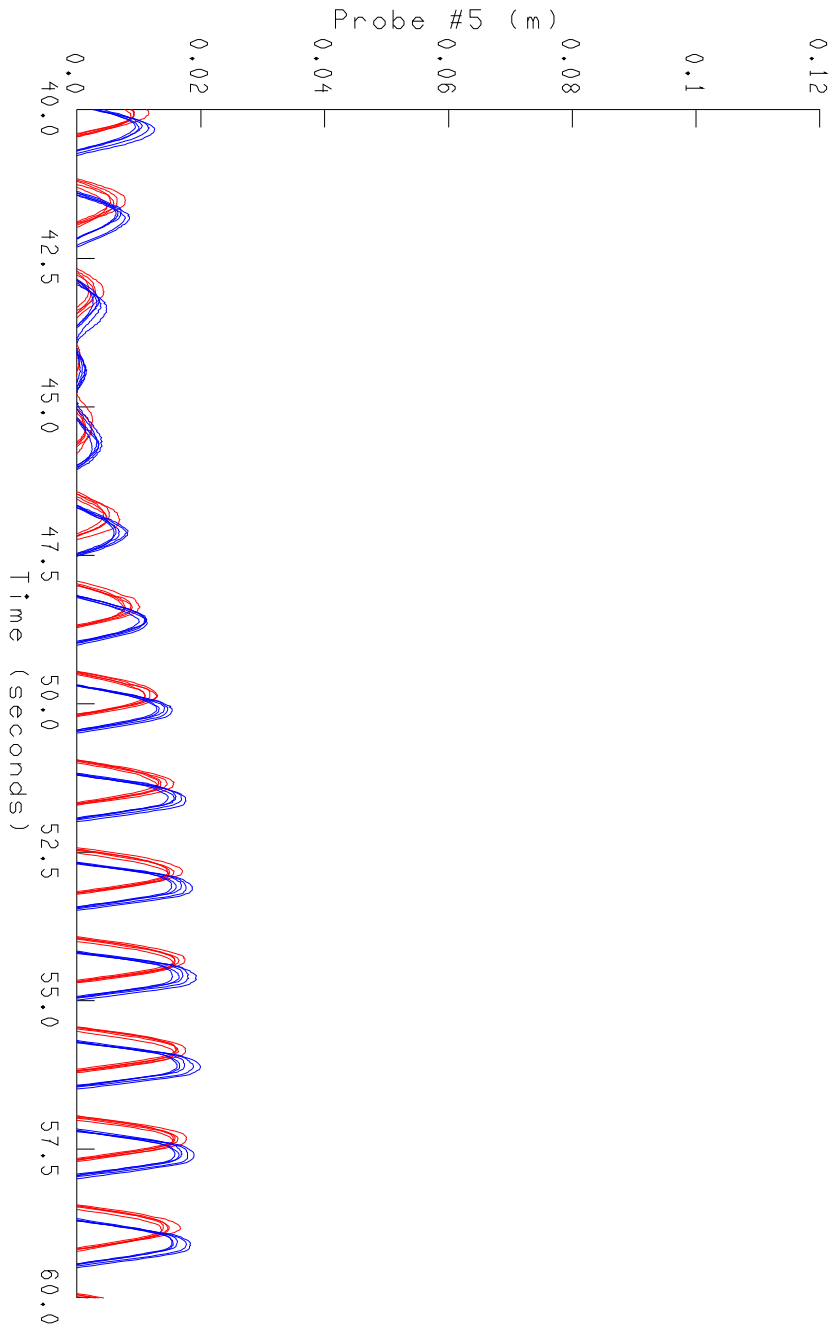

Fig. 25c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B8-2 : BIP8_H0P02_T1P55_T1P45

before after

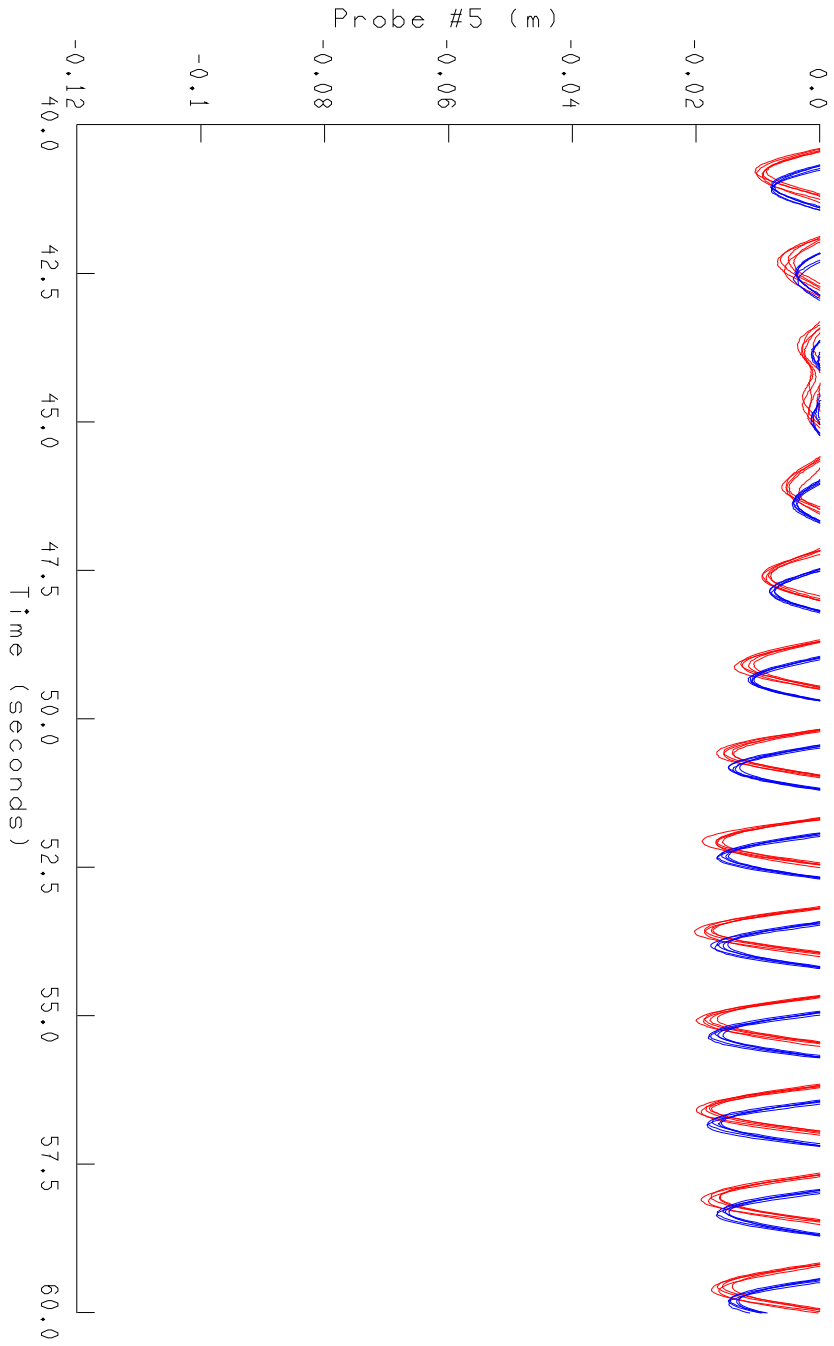

Fig. 25d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B8-2 : BIP8_H0P02_T1P55_T1P45

before after

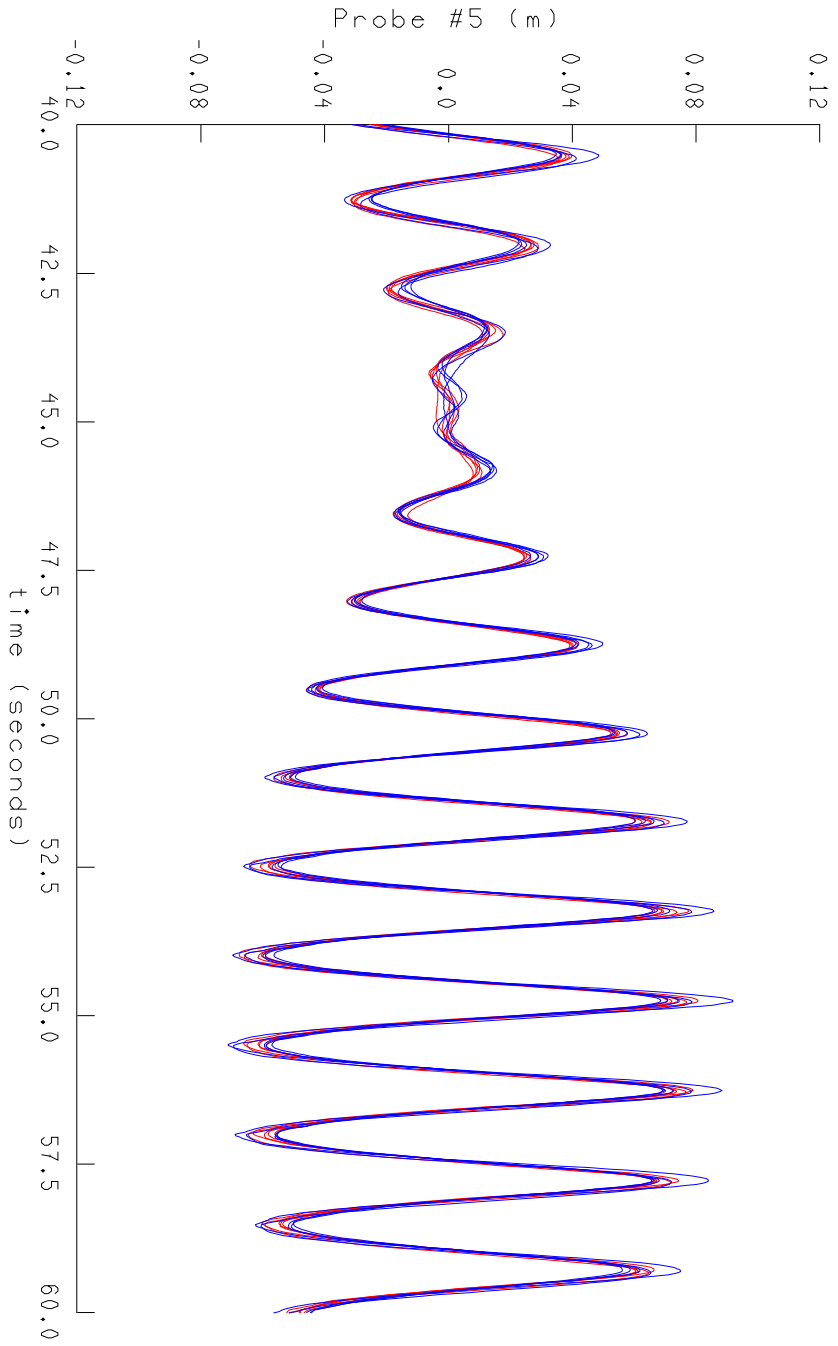

Fig. 26a: Surface elevations at Probes: 5-4-3-6-7
B8-3 : BIP8_H0P08_T1P55_T1P45

before after

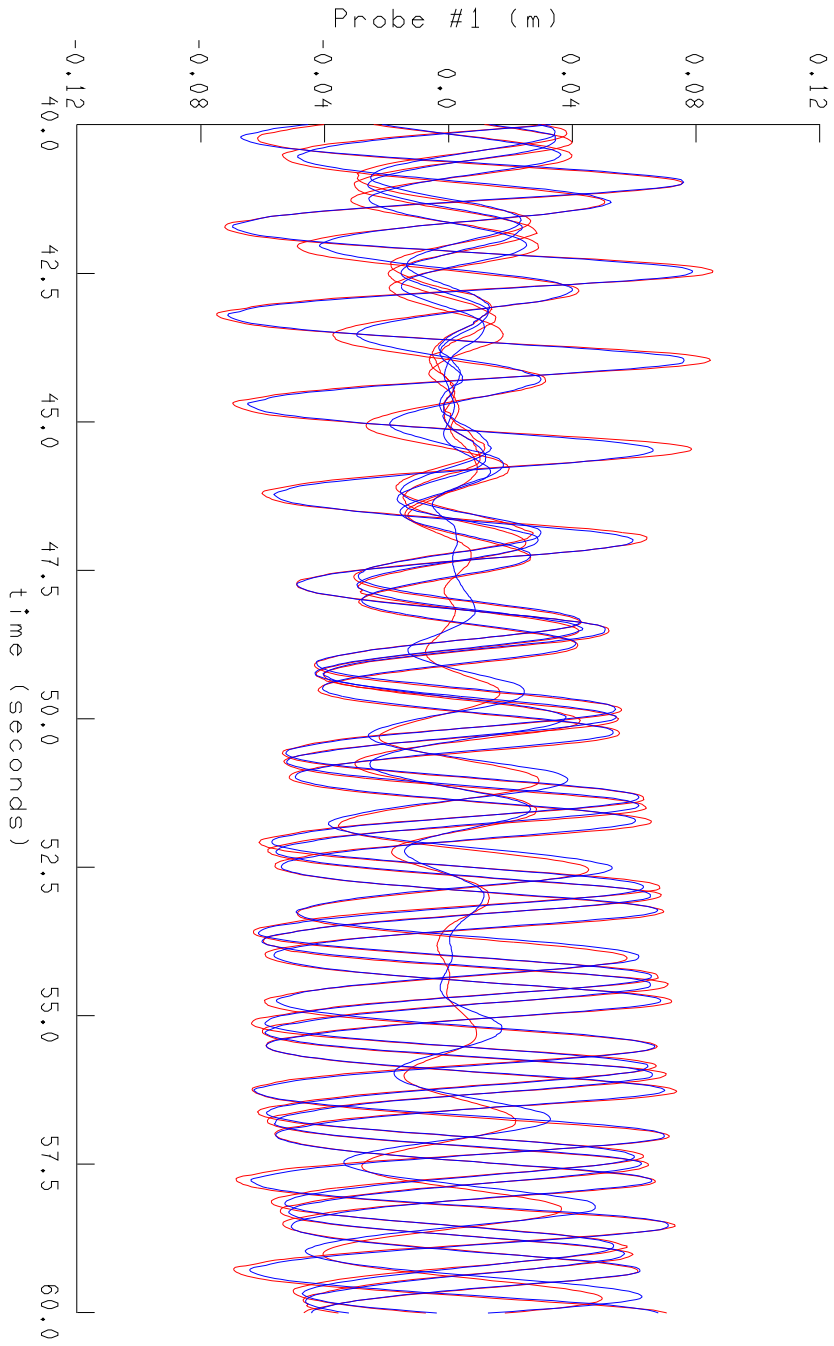

Fig. 26b: Surface elevations at Probes: 1-2-3-8-9
B8-3 : BIP8_H0P08_T1P55_T1P45

before after

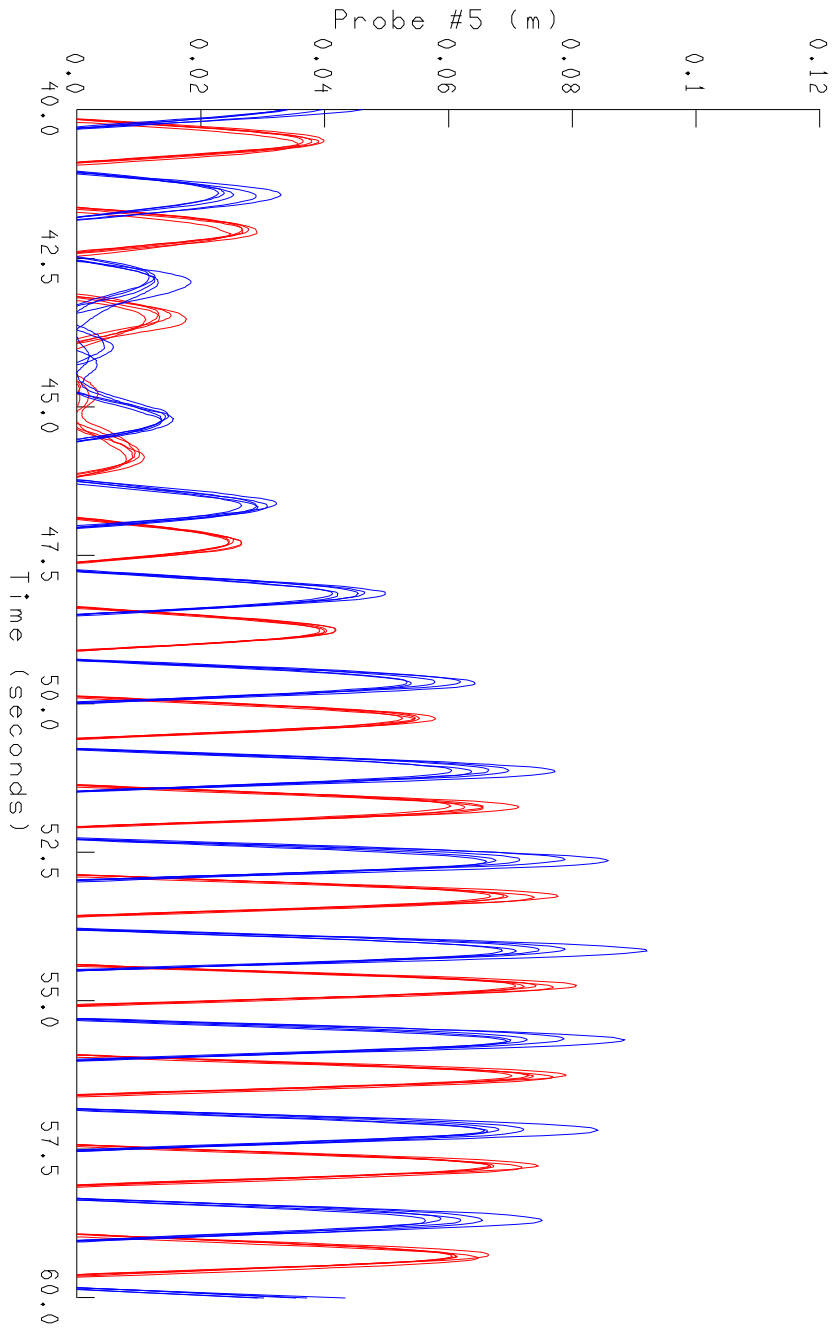

Fig. 26c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B8-3 : BIP8_H0P08_T1P55_T1P45

before after

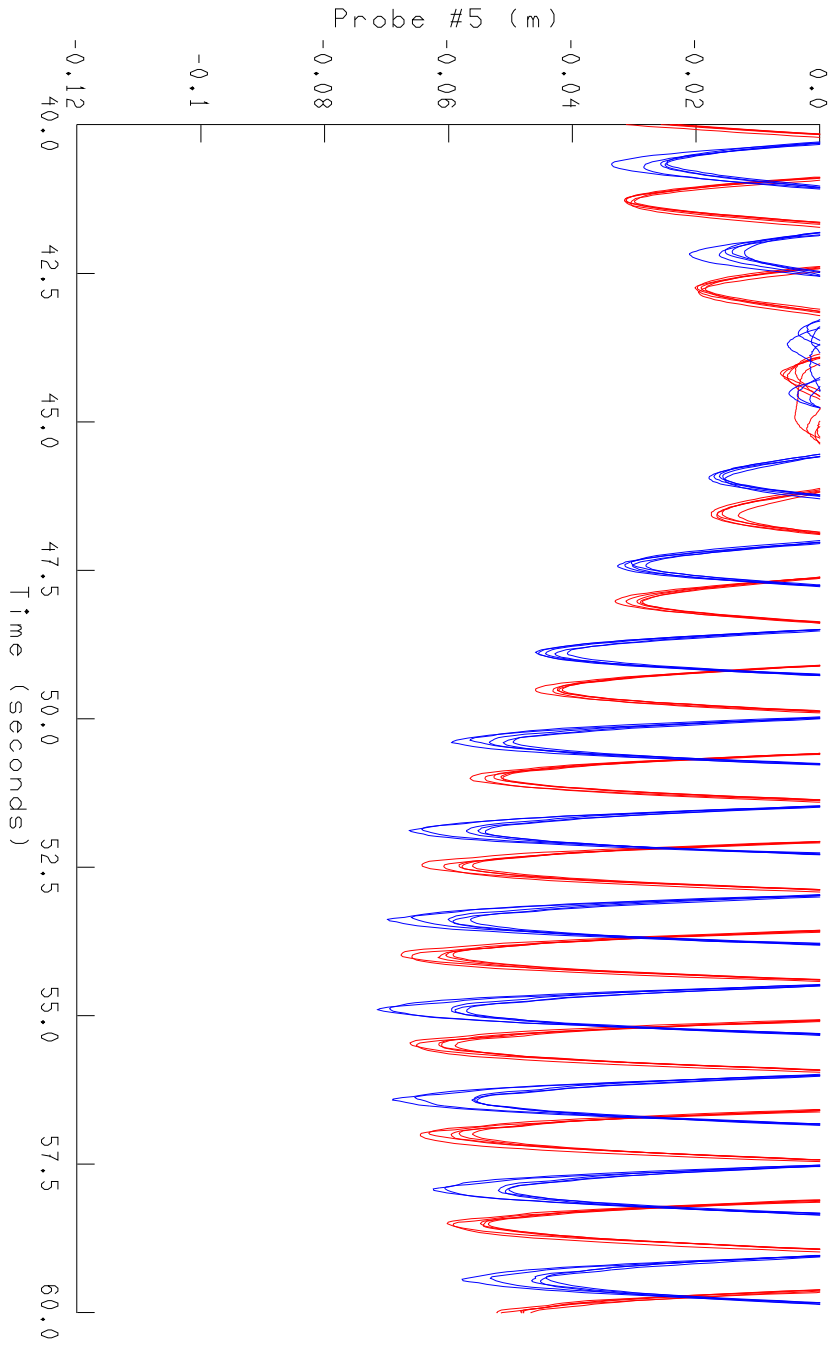

Fig. 26d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B8-3 : BIP8_H0P08_T1P55_T1P45

before after

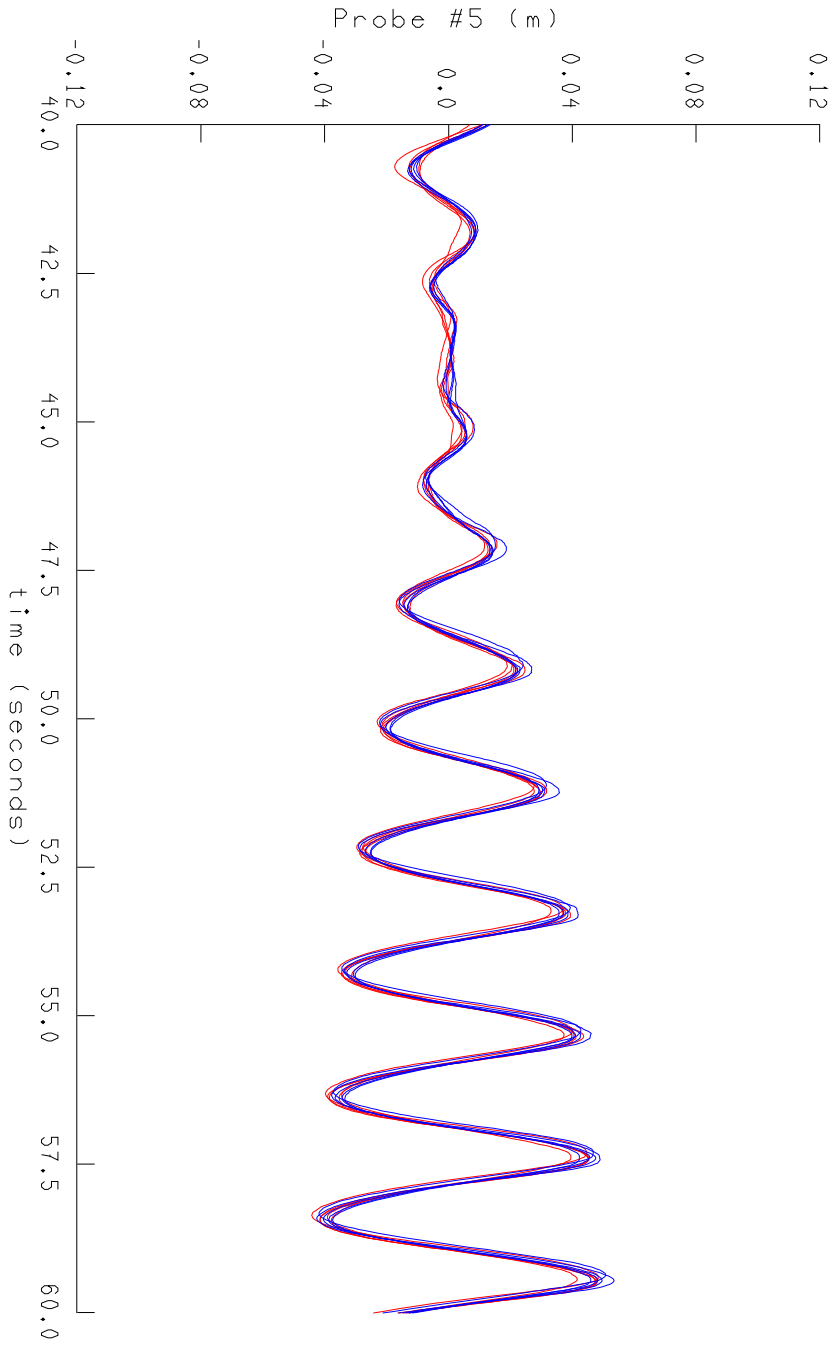

Fig. 27a: Surface elevations at Probes: 5-4-3-6-7
B8-4 : BIP8_H0P06_T2P12_T2P02

before after

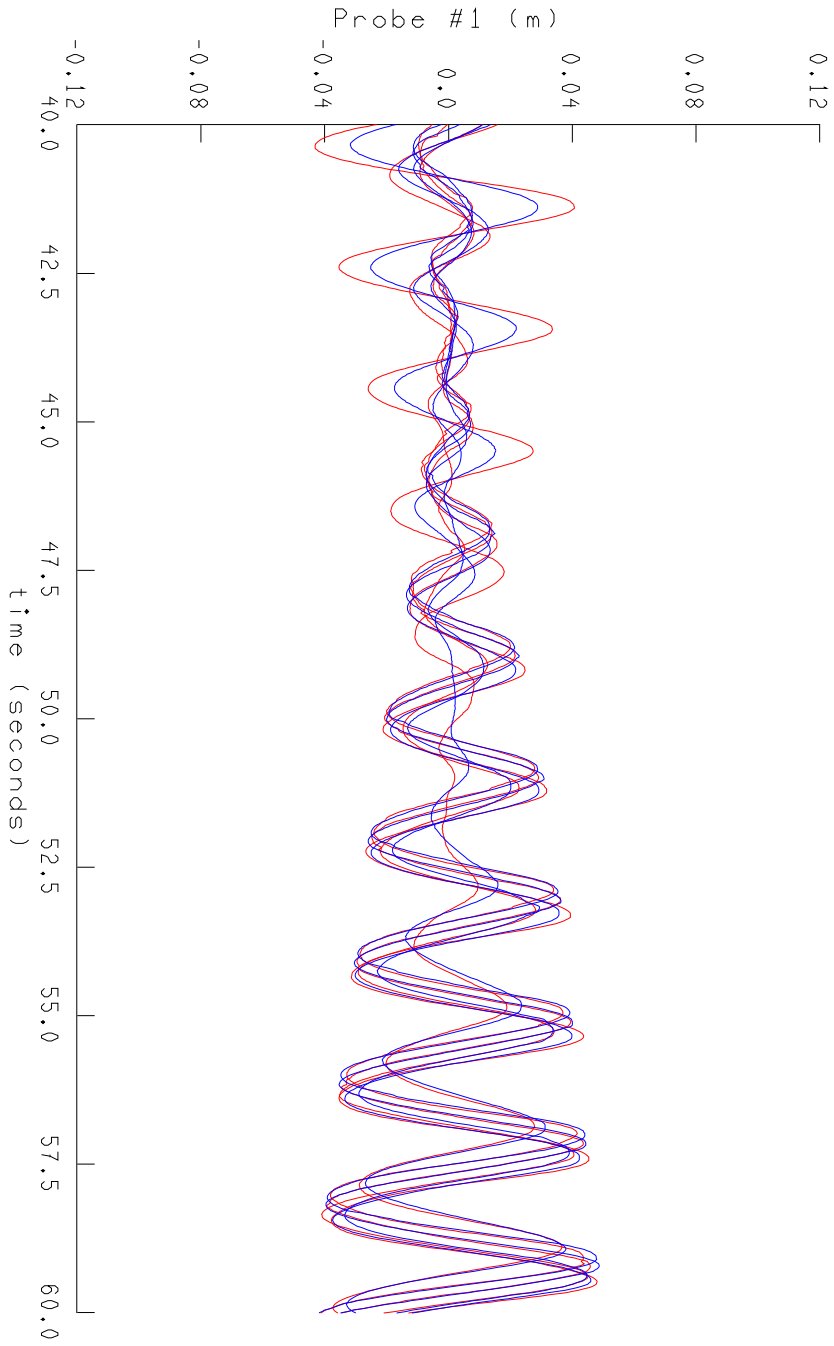

Fig. 27b: Surface elevations at Probes: 1-2-3-8-9
B8-4 : BIP8_H0P06_T2P12_T2P02

before after

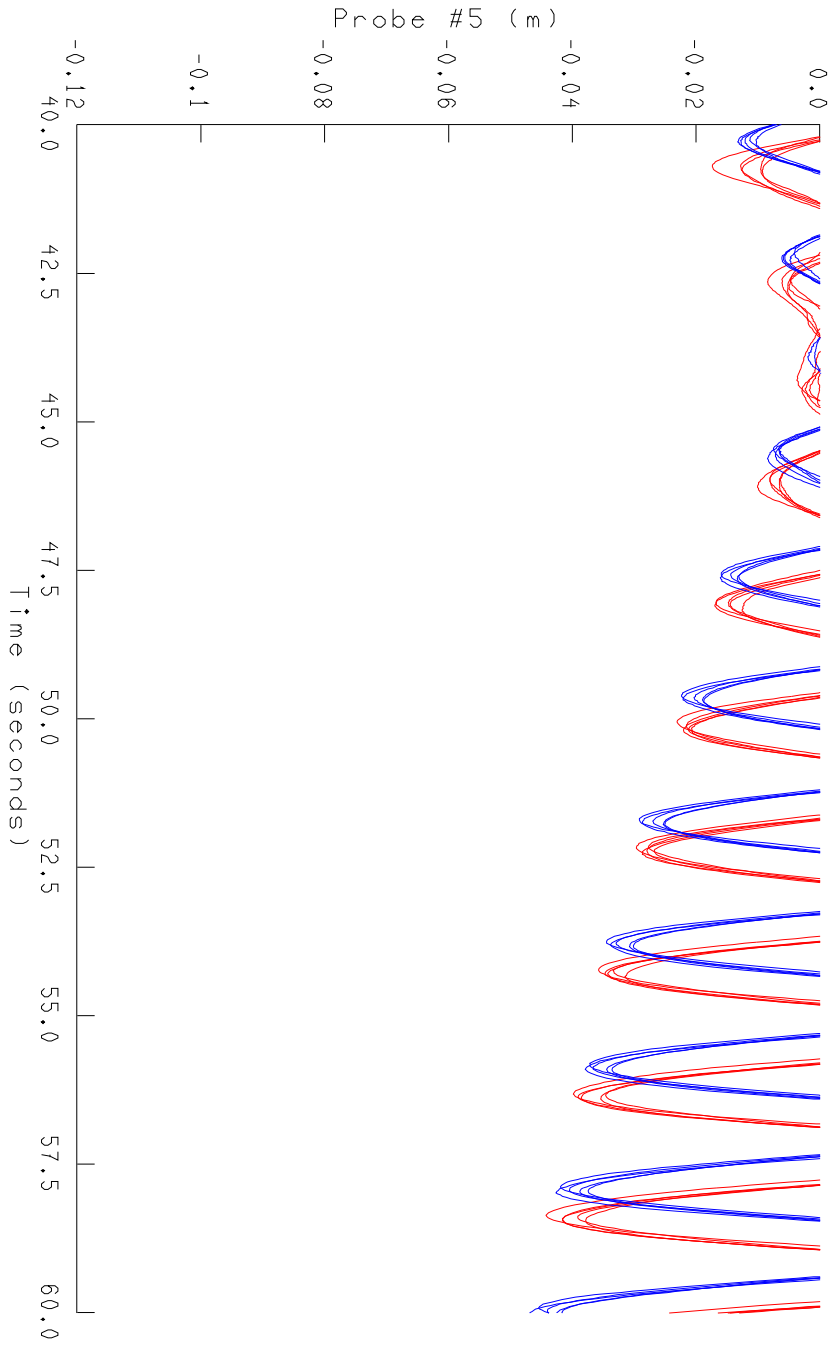

Fig. 27c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B8-4 : BIP8_H0P06_T2P12_T2P02

before after

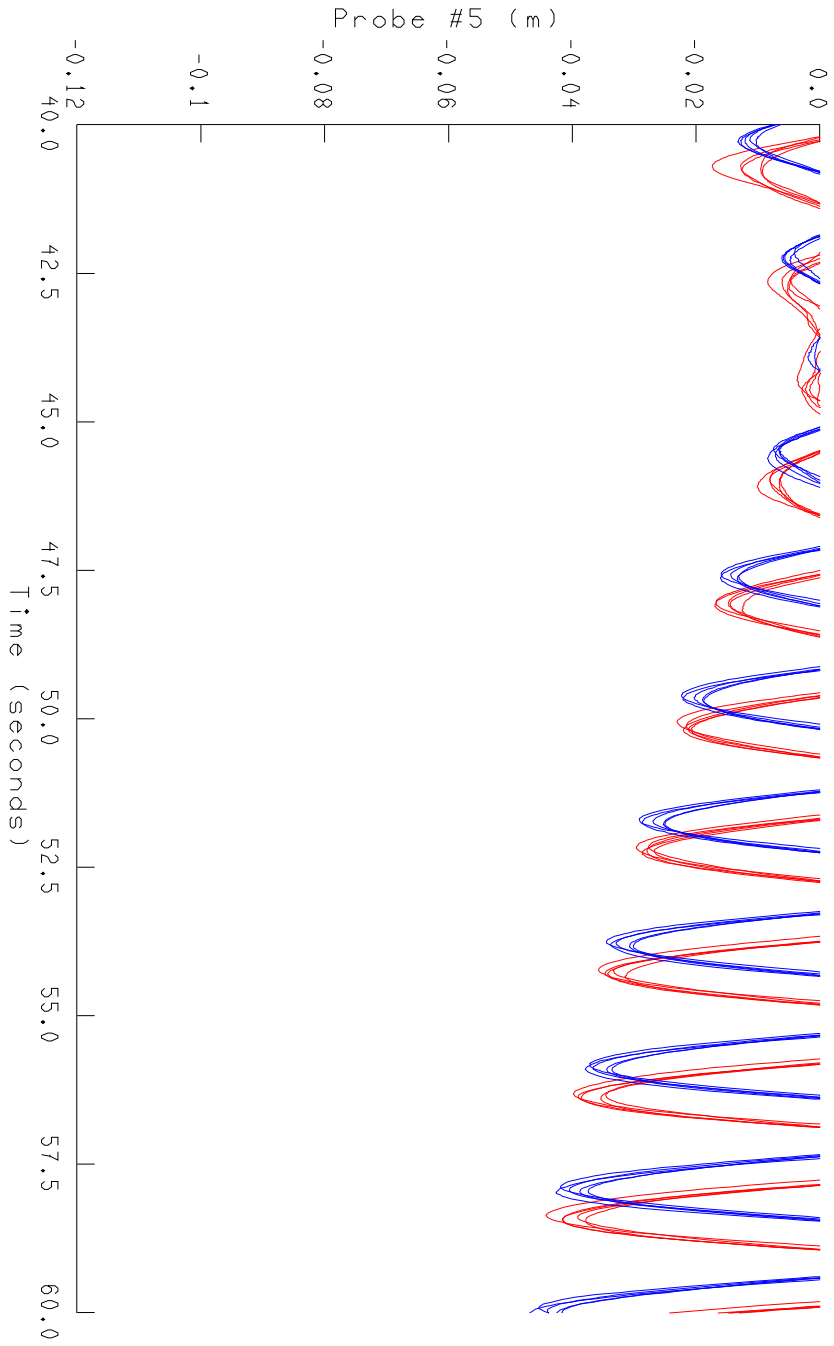

Fig. 27d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B8-4 : BIP8_H0P06_T2P12_T2P02

before after

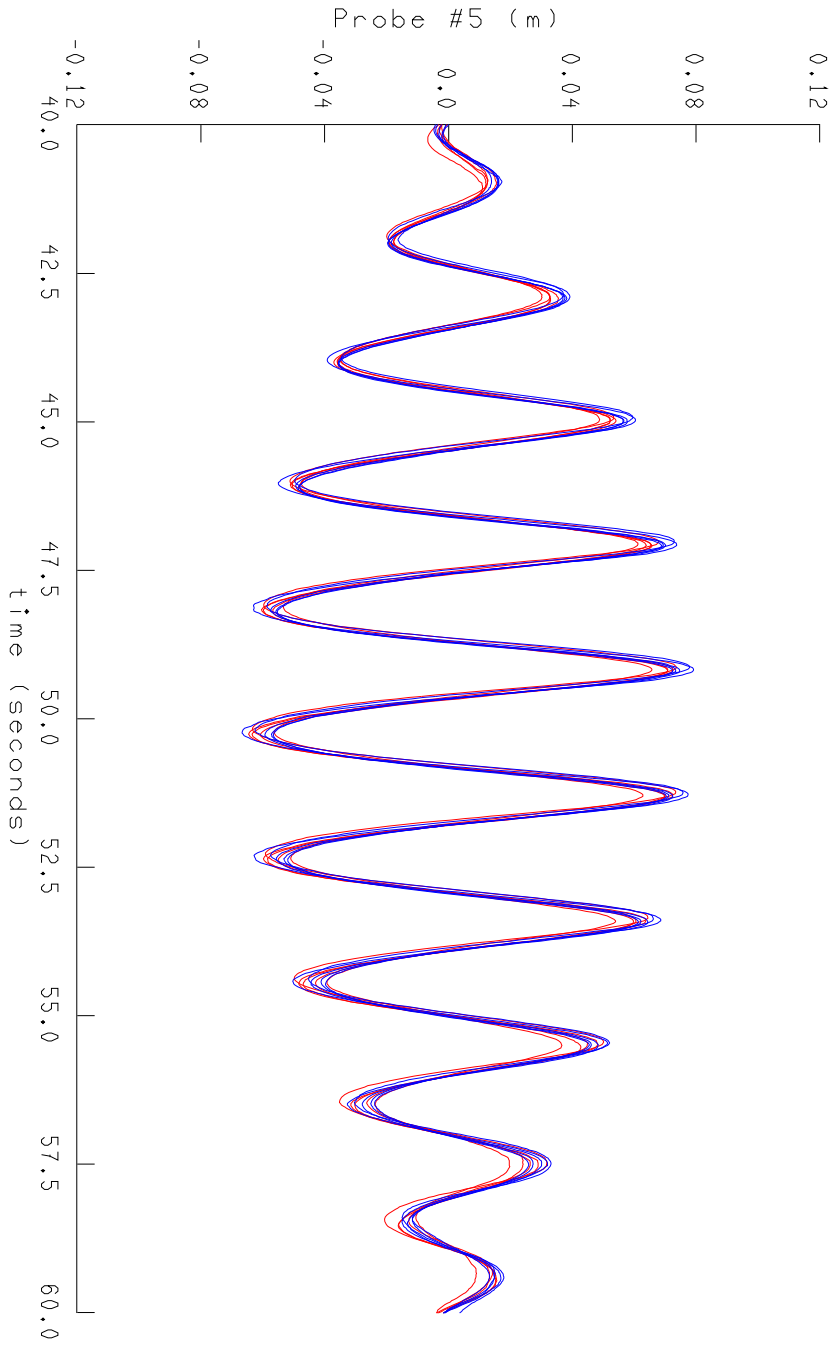

Fig. 28a: Surface elevations at Probes: 5-4-3-6-7
B8-5 : BIP8_H0P08_T2P22_T2P0

before after

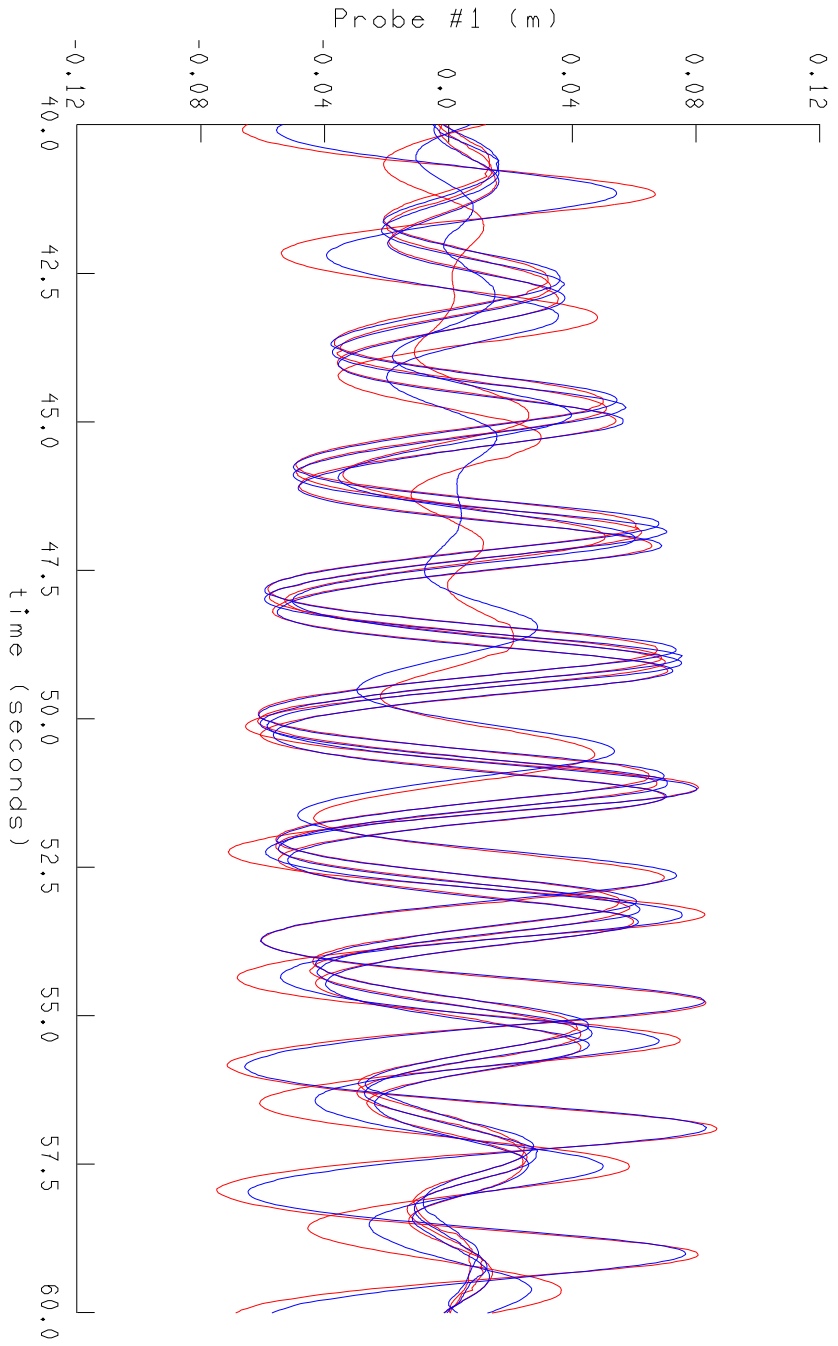

Fig. 28b: Surface elevations at Probes: 1-2-3-8-9
B8-5 : BIP8_H0P08_T2P22_T2P0

before after

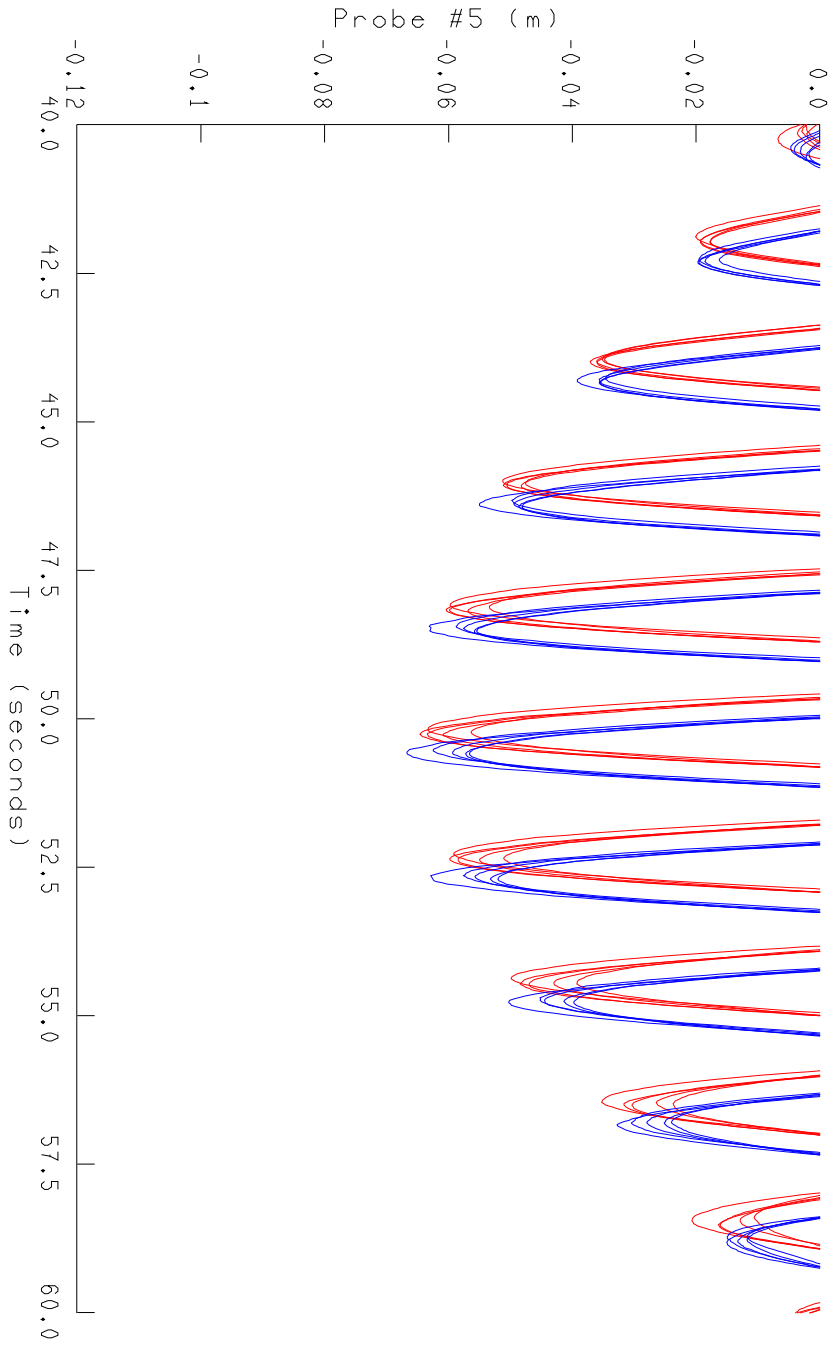

Fig. 28c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B8-5 : BIP8_H0P08_T2P22_T2P0

before after

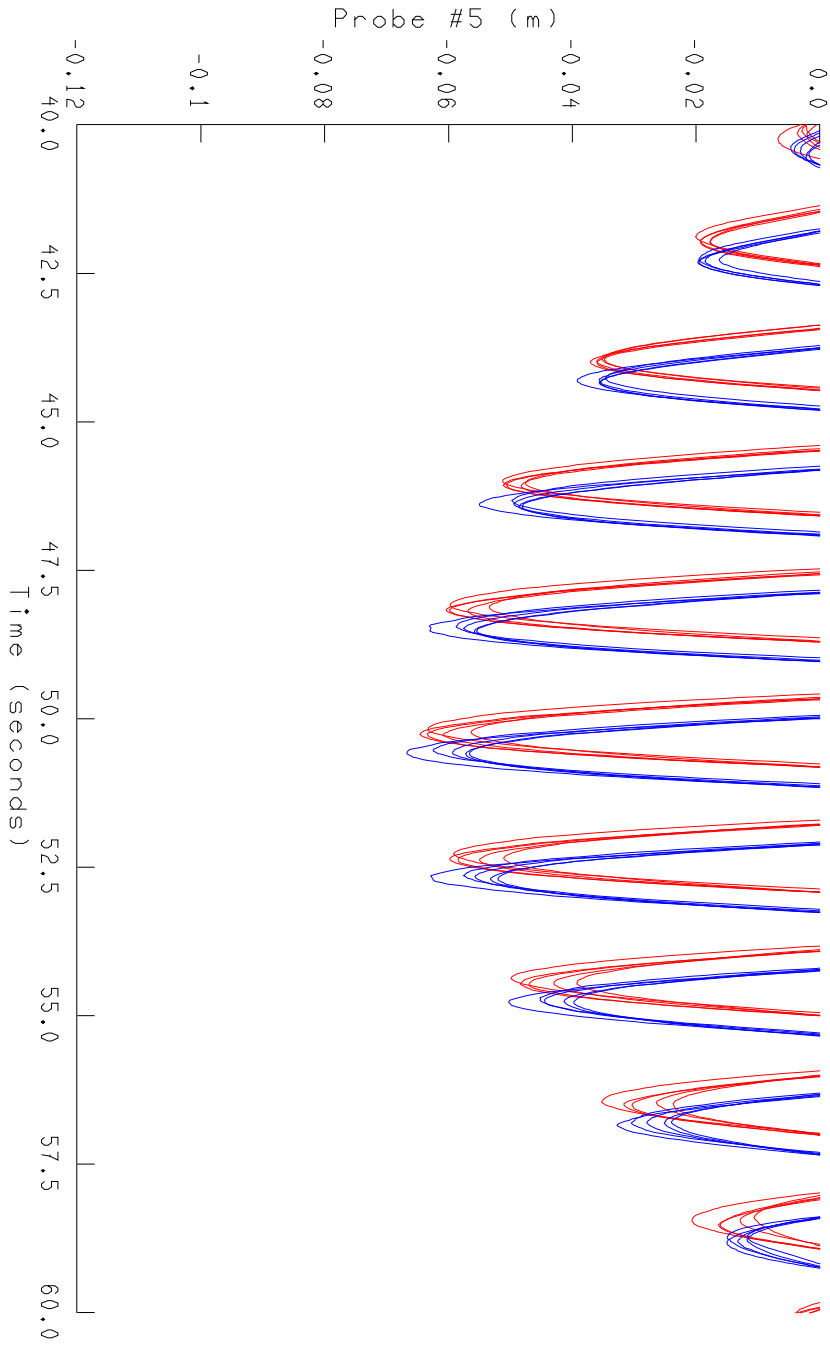

Fig. 28d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B8-5 : BIP8_H0P08_T2P22_T2P0

before after

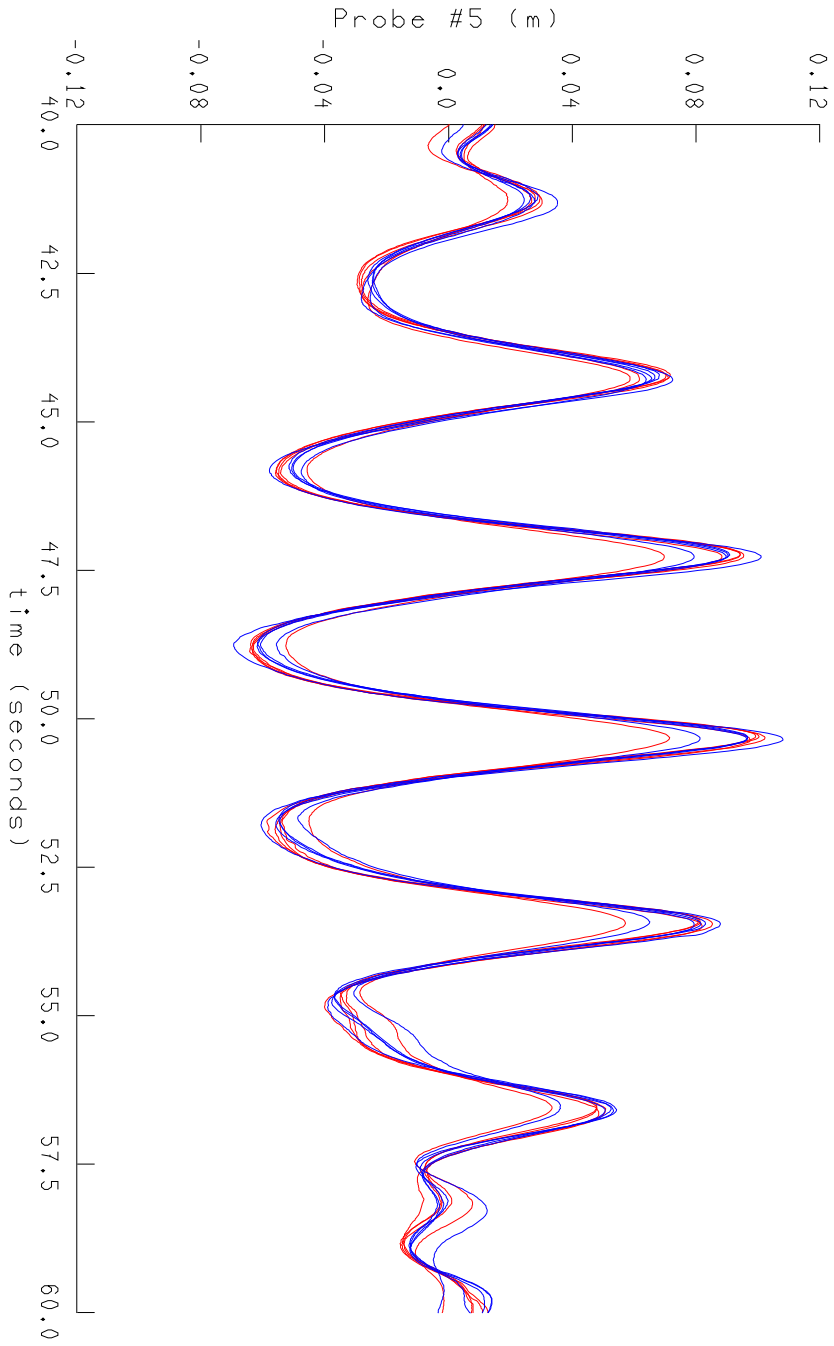

Fig. 29a: Surface elevations at Probes: 5-4-3-6-7
B8-5 : BIP8_H0P08_T3P33_T2P85

before after

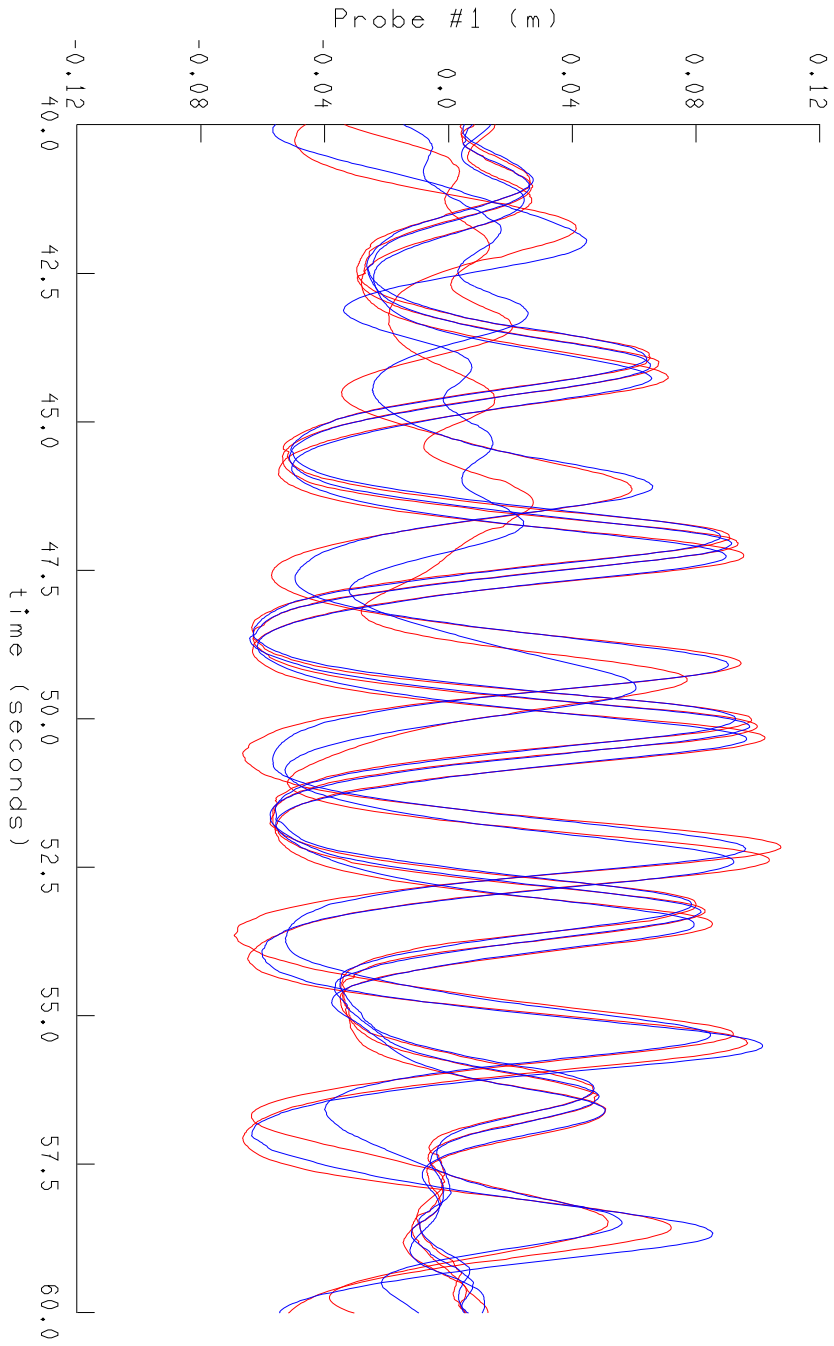

Fig. 29b: Surface elevations at Probes: 1-2-3-8-9
B8-5 : BIP8_H0P08_T3P33_T2P85

before after

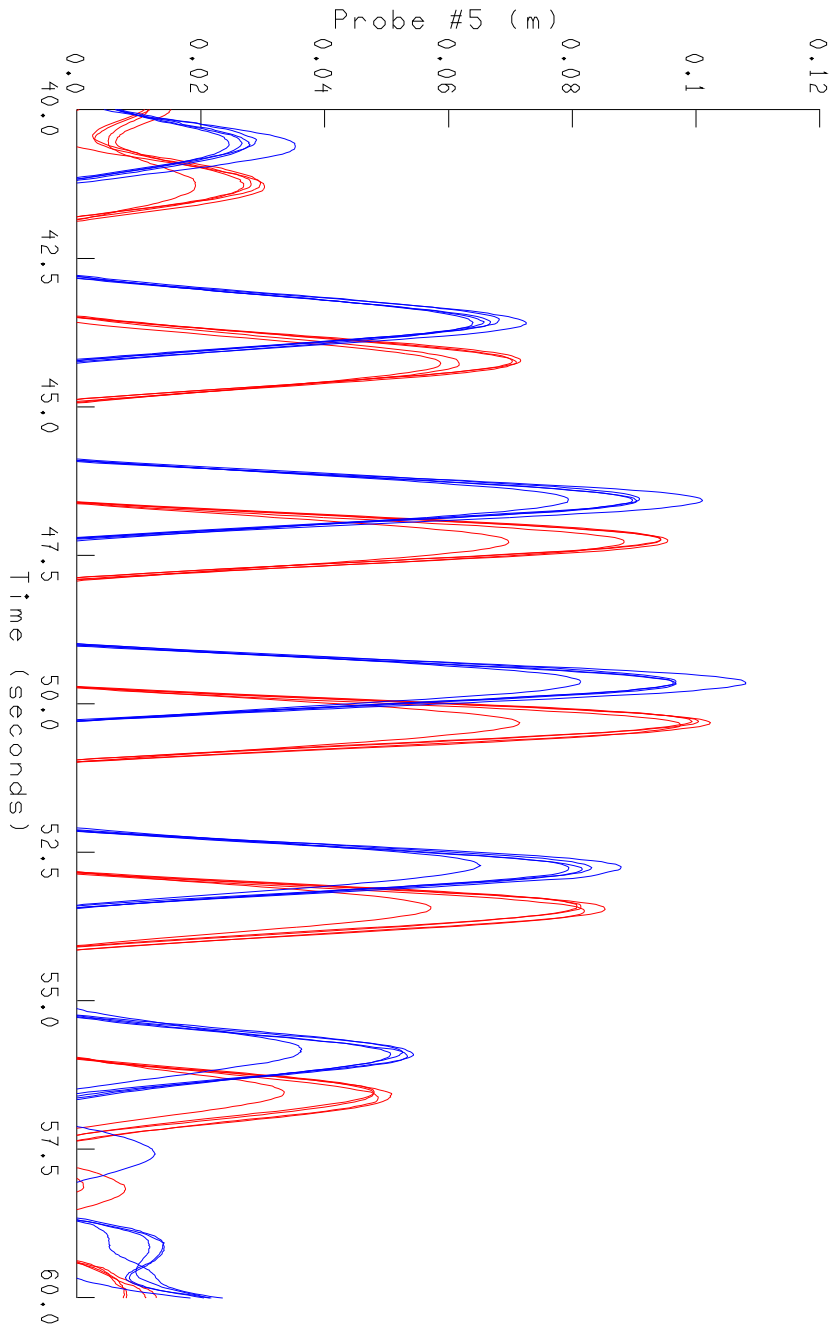

Fig. 29c: Surface elevations at Probes: 5-4-3-6-7 (Crest)
B8-5 : BIP8_H0P08_T3P33_T2P85

before after

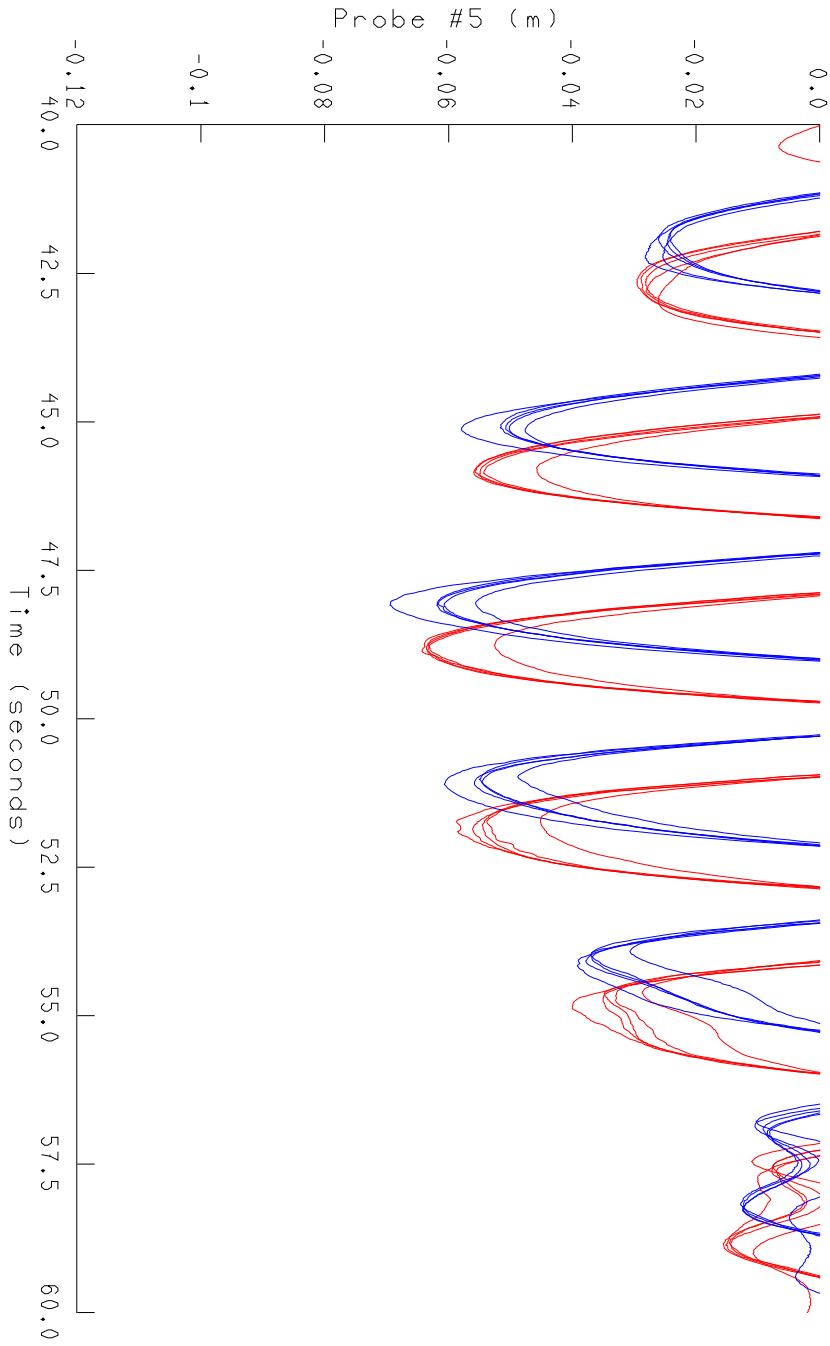

Fig. 29d: Surface elevations at Probes: 5-4-3-6-7 (Trough)
B8-5 : BIP8_H0P08_T3P33_T2P85

before after

APPENDIX - III

Energy distributions for measured waves (SPEC1 and SPEC2), isolated Primary Waves (PW), Bounded Wave (BW), Free Wave-1 (FW1) and Free Wave-2 (FW2) for mono-chromatic waves

Probes array:

Probes: 5-4-3-6-7
Probes: 11-12-13
Probes 1-2-3-8-9-10

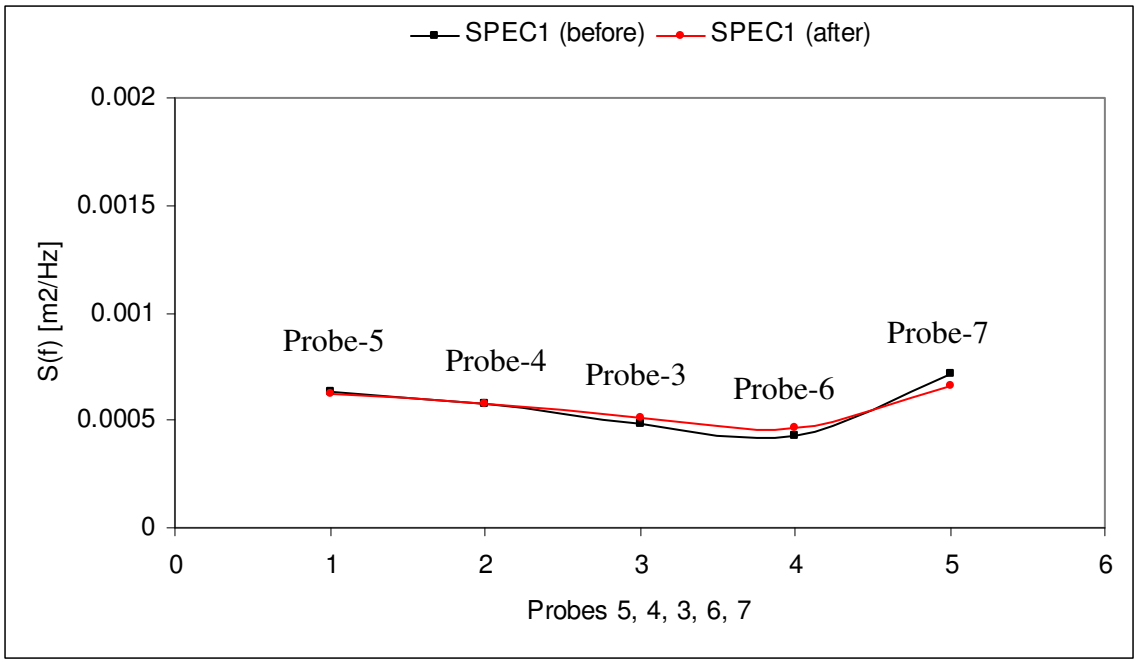

Fig. 30*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-1: REGP4_H0P08_T2P145

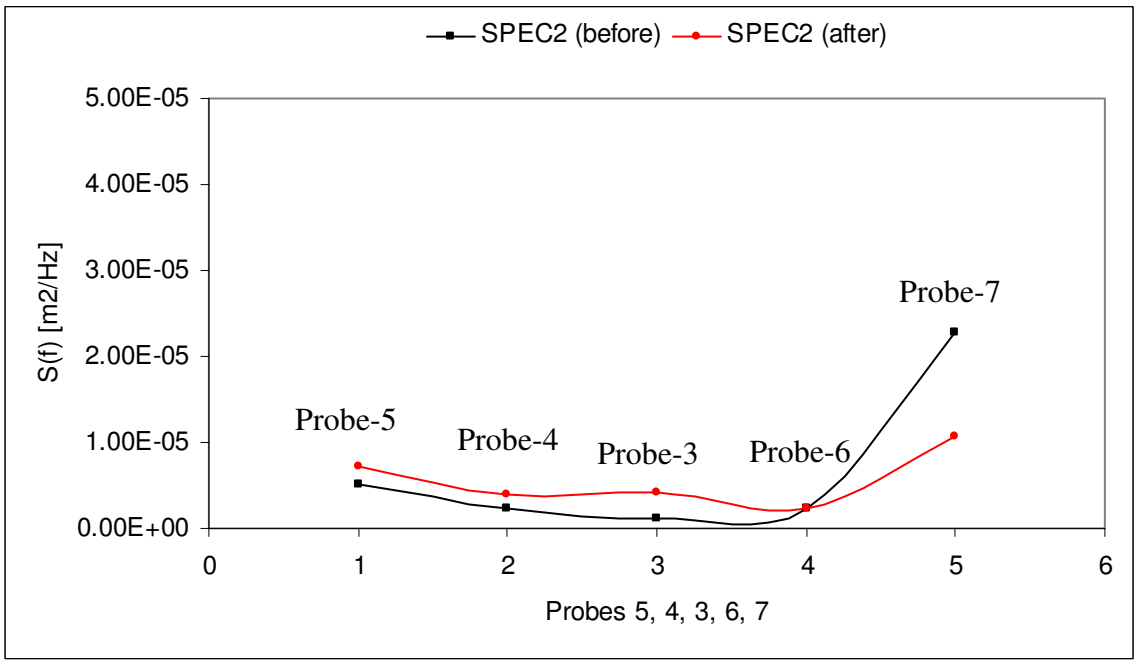

Fig. 30*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-1: REGP4_H0P08_T2P145

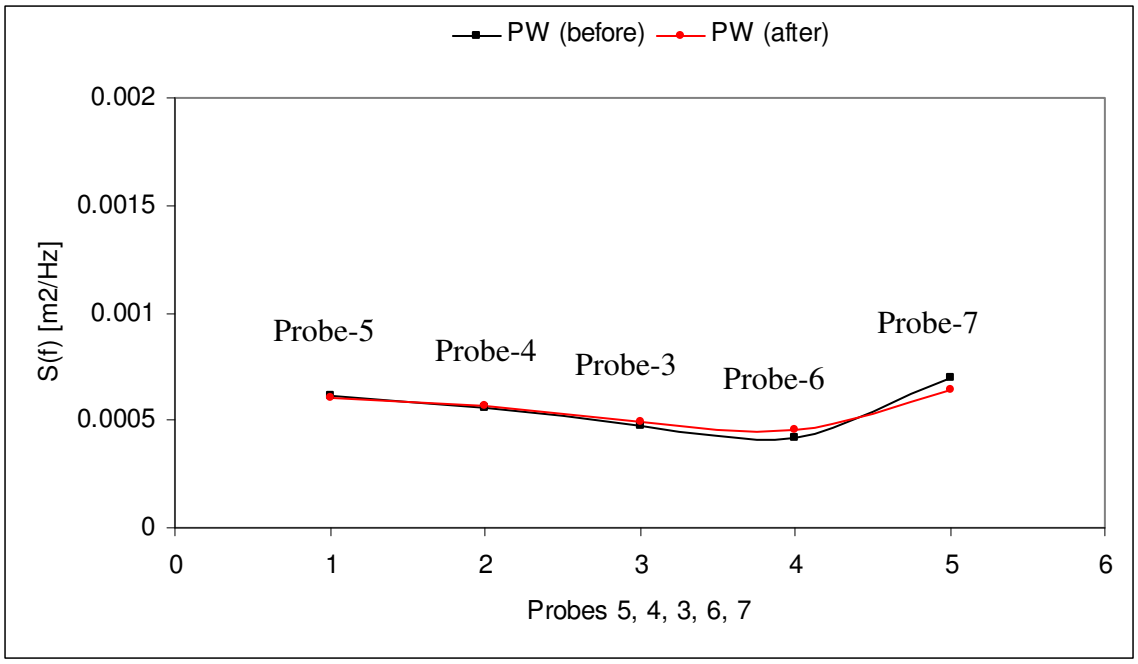

Fig. 30*c*: Cross-tank energy distribution for isolated principal waves
M4-1: REGP4_H0P08_T2P145

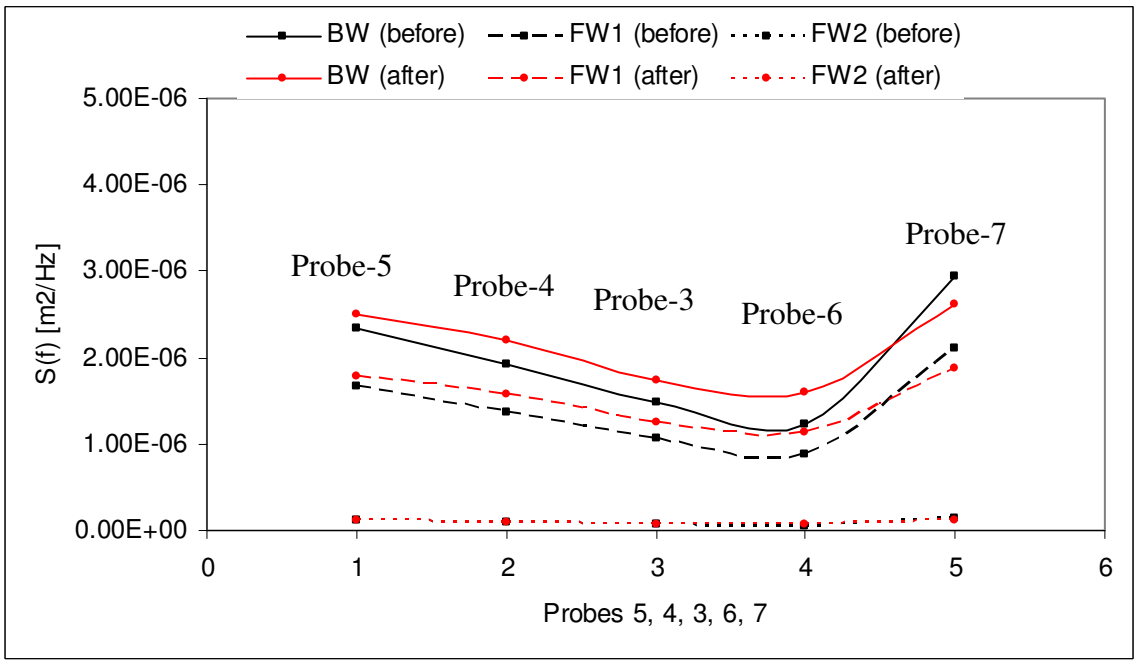

Fig. 30*d*: Cross-tank energy distribution for isolated second-order waves
M4-1: REGP4_H0P08_T2P145

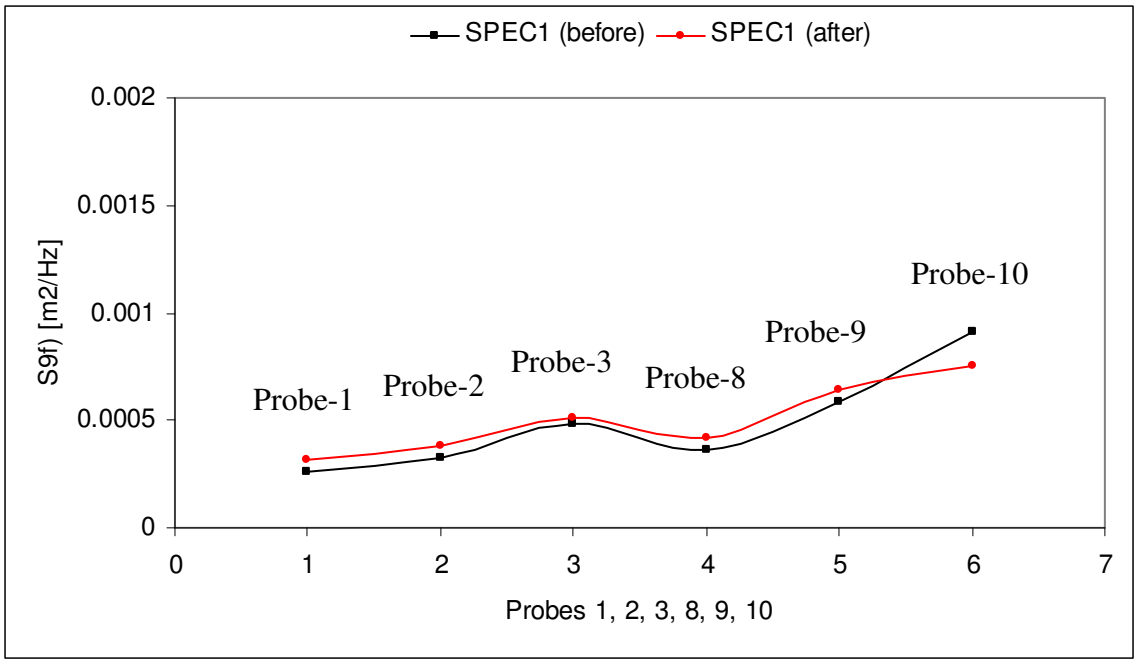

Fig. 30*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-1: REGP4_H0P08_T2P145

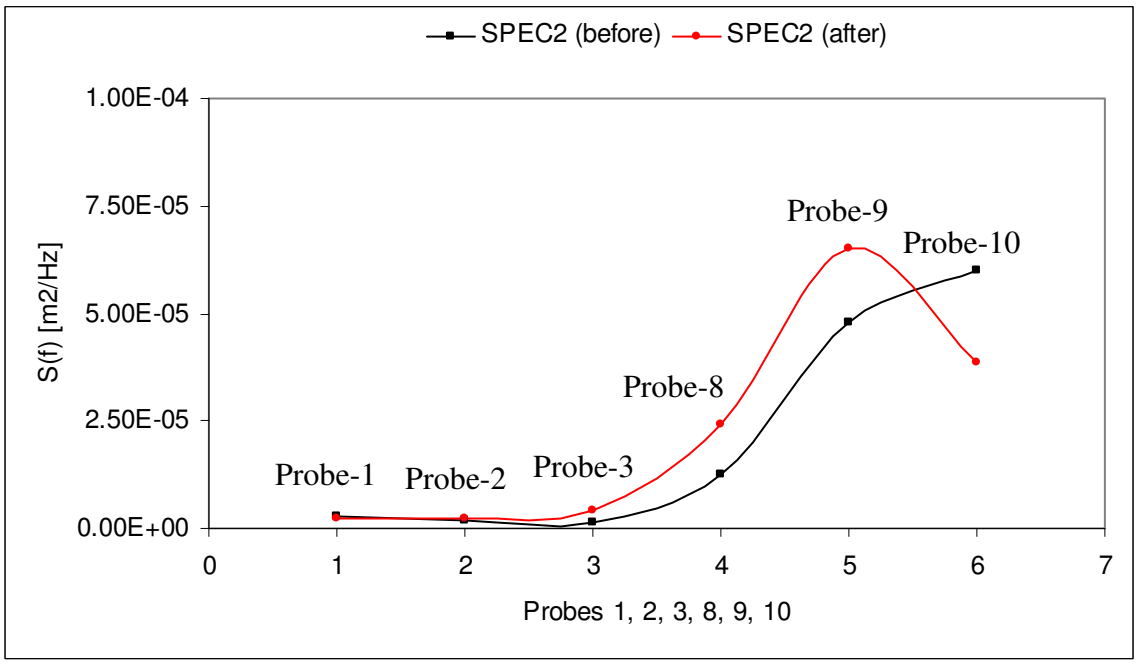

Fig. 30*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-1: REGP4_H0P08_T2P145

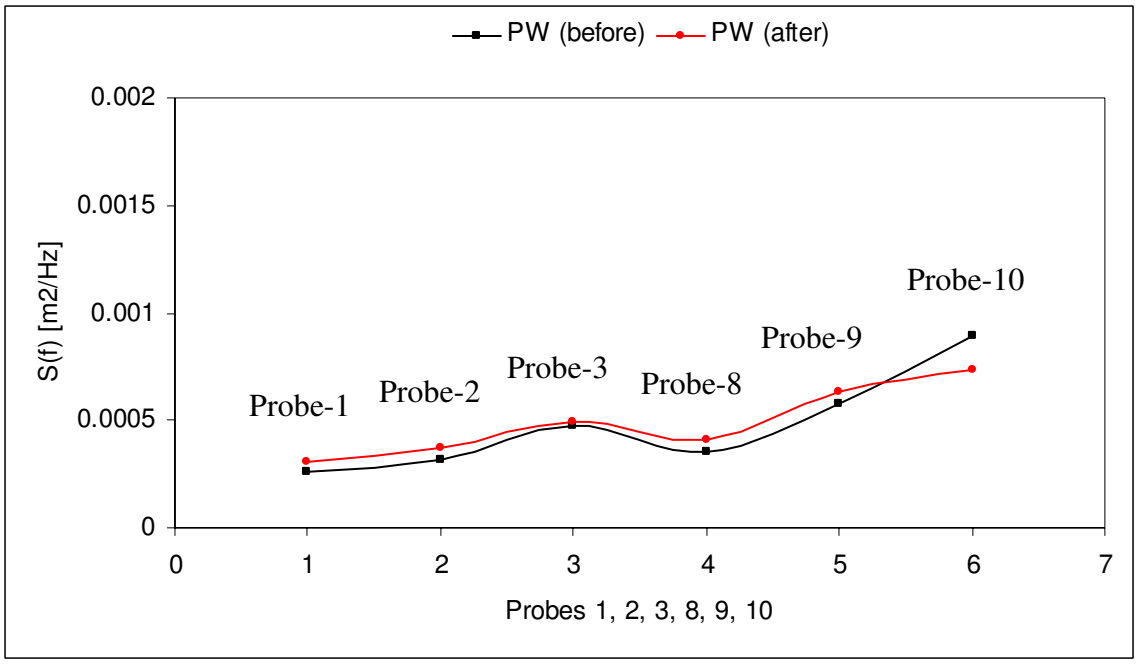

Fig. 30*g*: Along-tank energy distribution for isolated principal waves
M4-1: REGP4_H0P08_T2P145

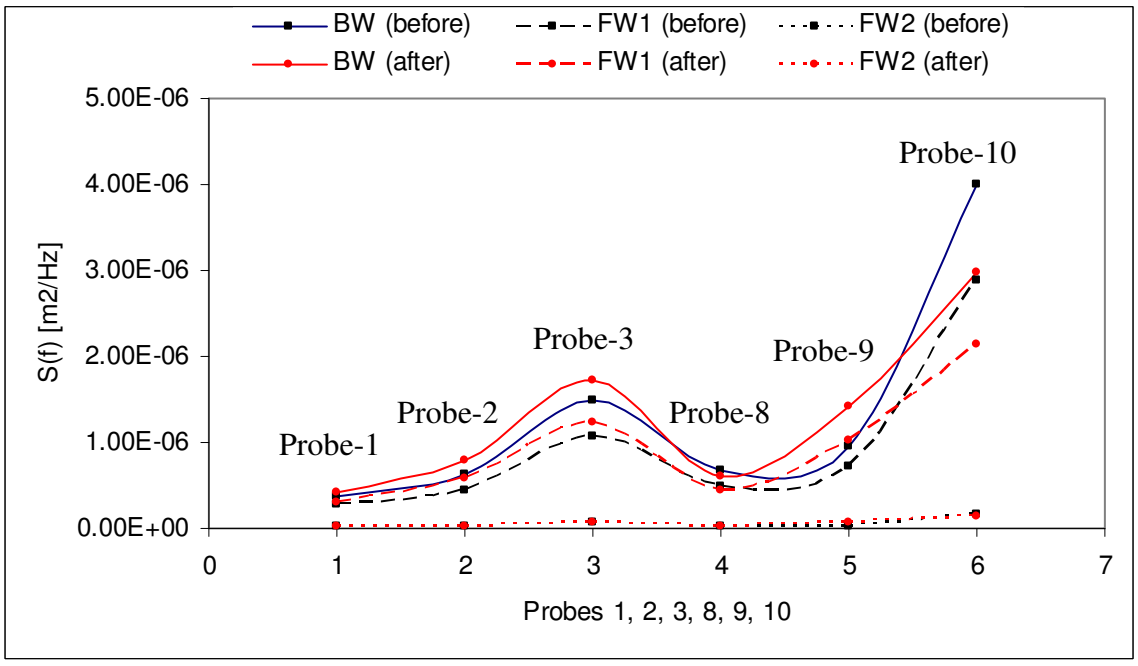

Fig. 30*h*: Along-tank energy distribution for isolated second-order waves
M4-1: REGP4_H0P08_T2P145

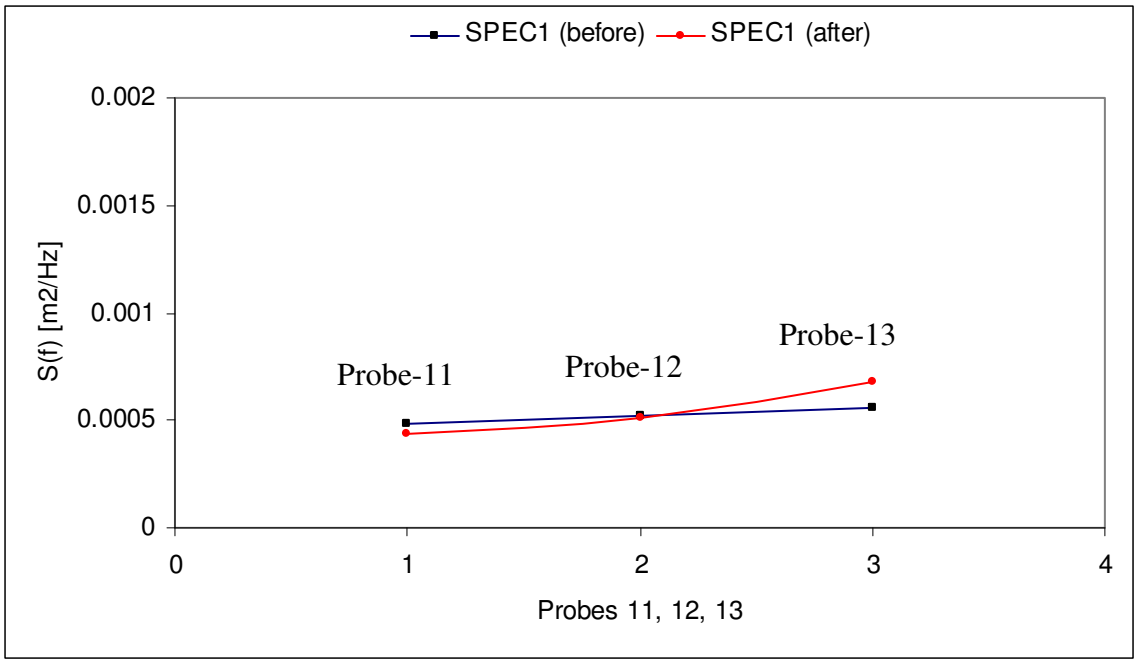

Fig. 30*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-1: REGP4_H0P08_T2P145

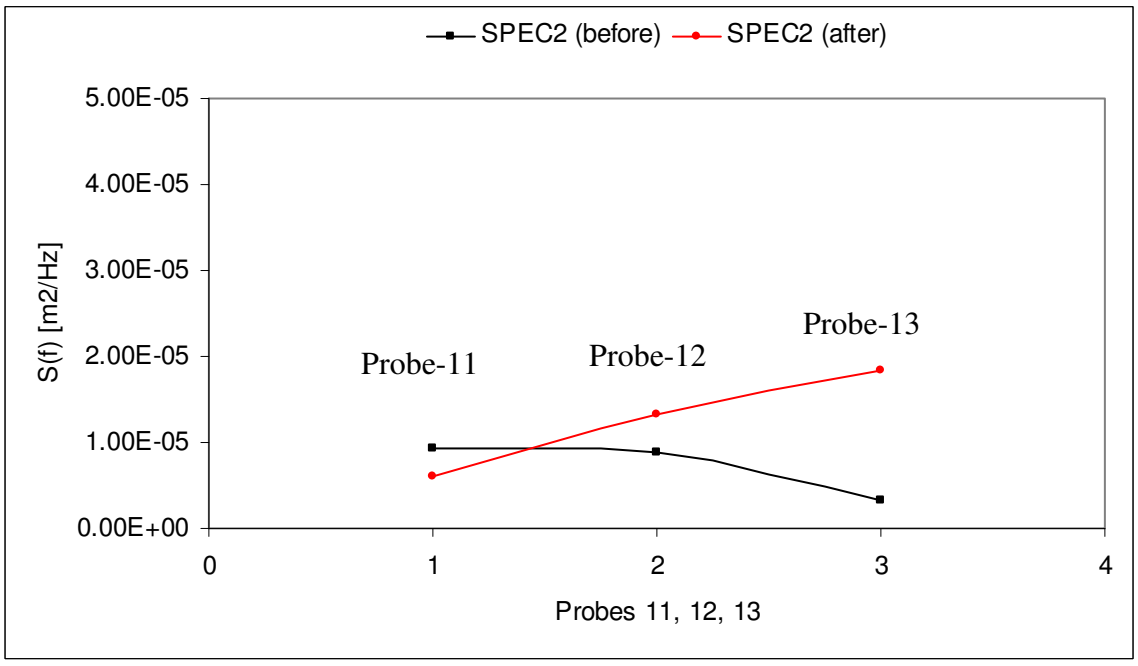

Fig. 30*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-1: REGP4_H0P08_T2P145

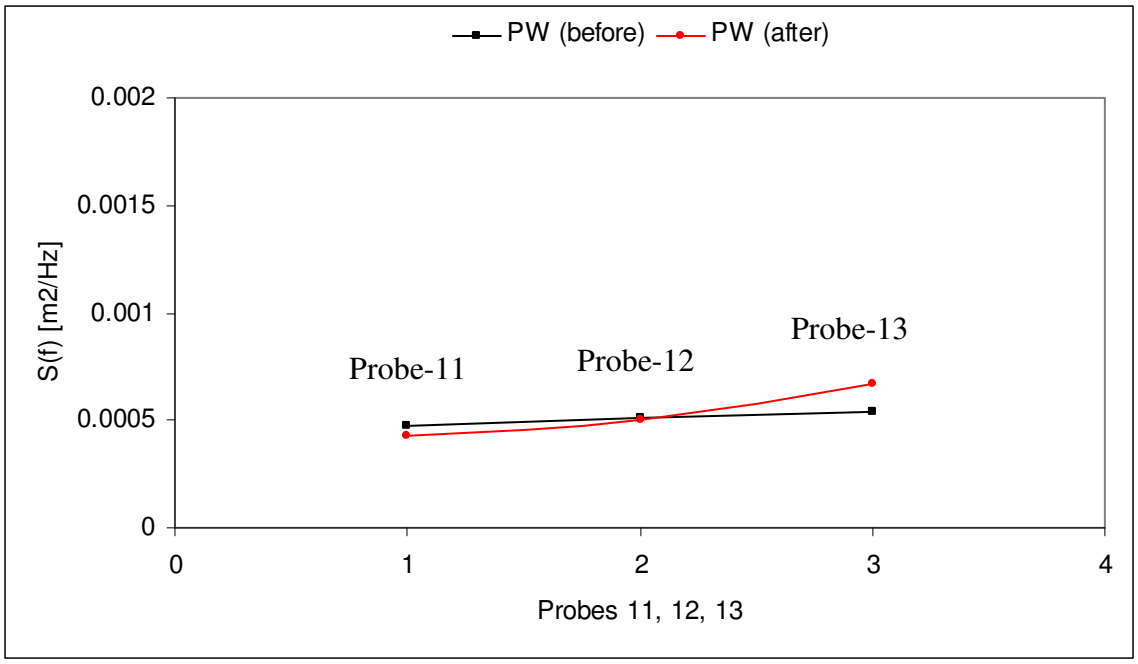

Fig. 30*k*: Cross-tank energy distribution for isolated principal waves
M4-1: REGP4_H0P08_T2P145

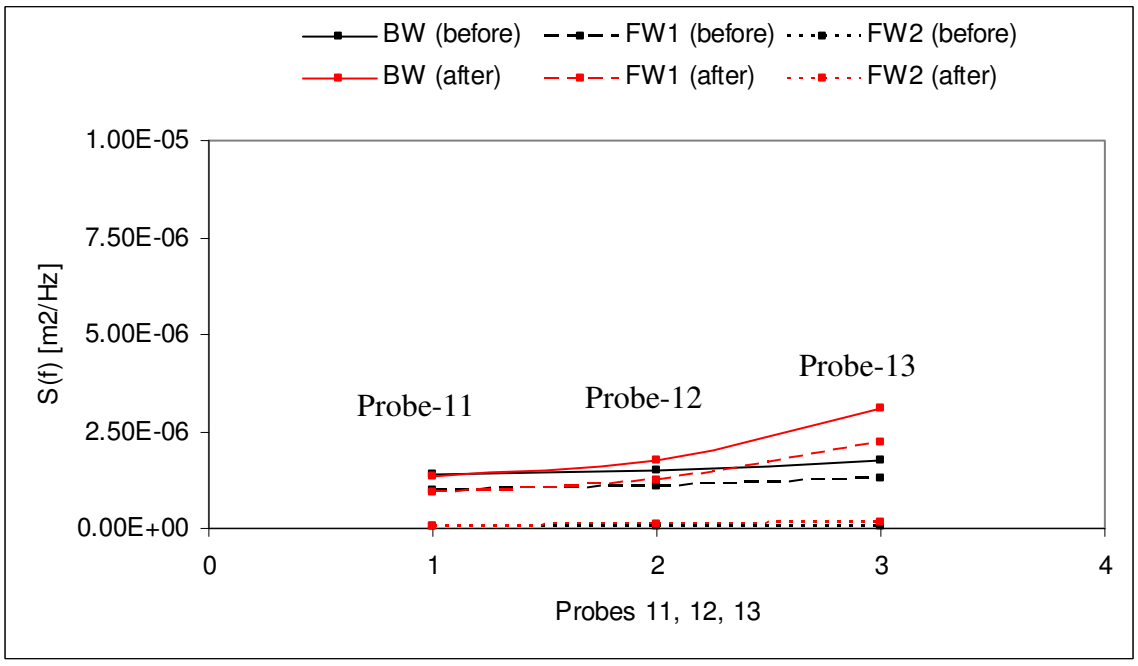

Fig. 30*l*: Cross-tank energy distribution for isolated second-order waves
M4-1: REGP4_H0P08_T2P145

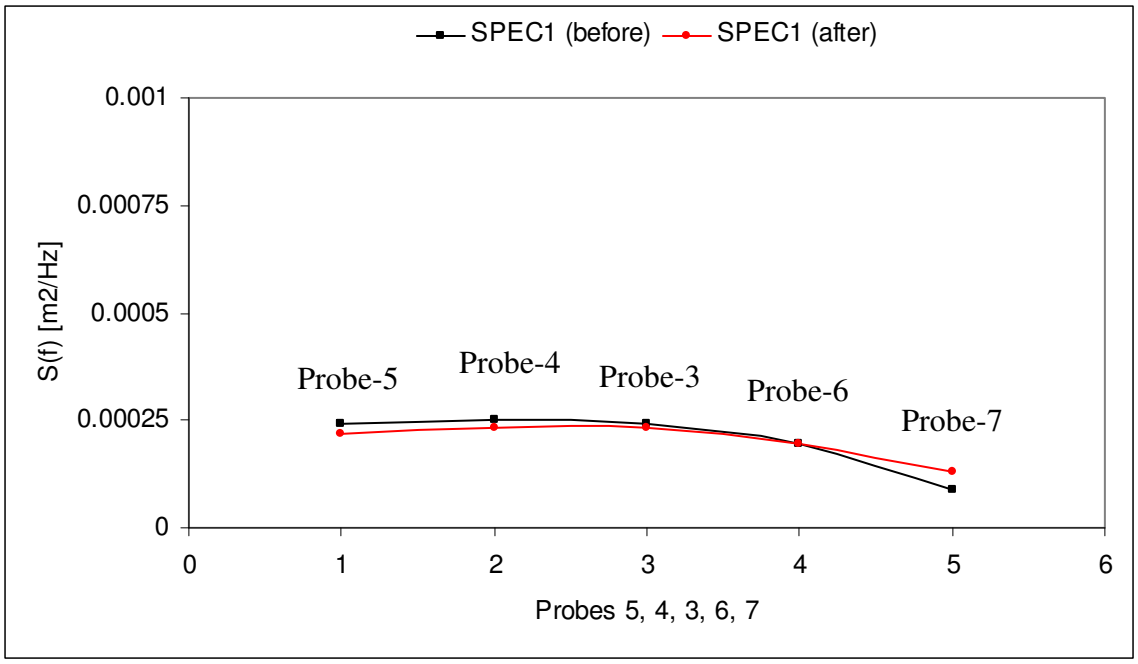

Fig. 31*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-2: REGP4_H0P06_T3P116

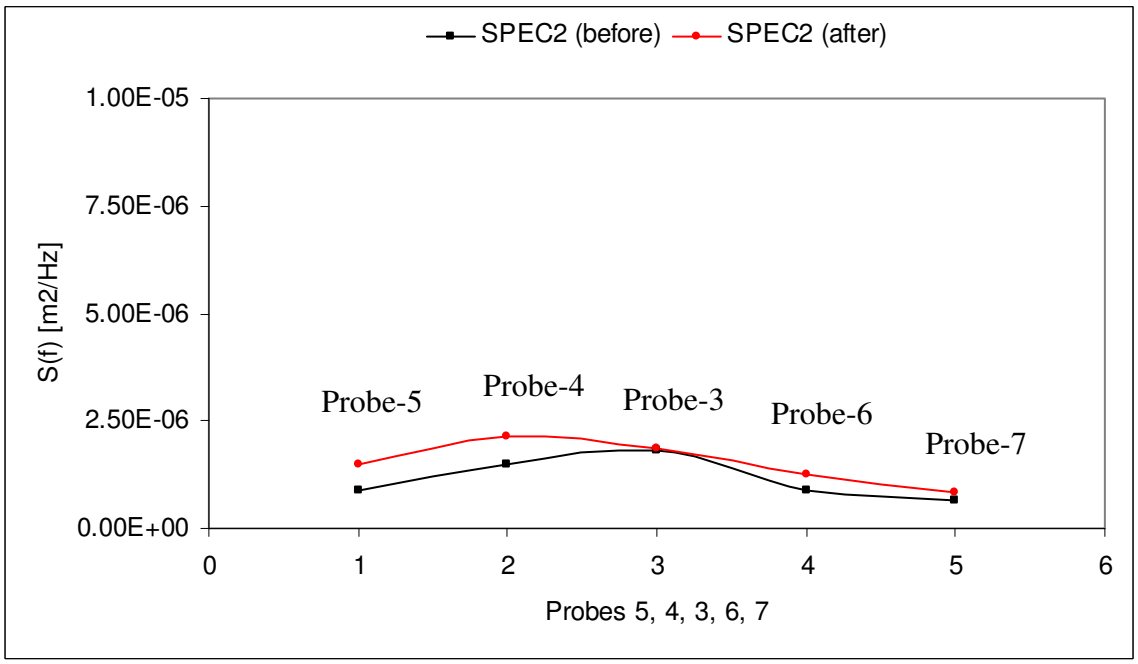

Fig. 31*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-2: REGP4_H0P06_T3P116

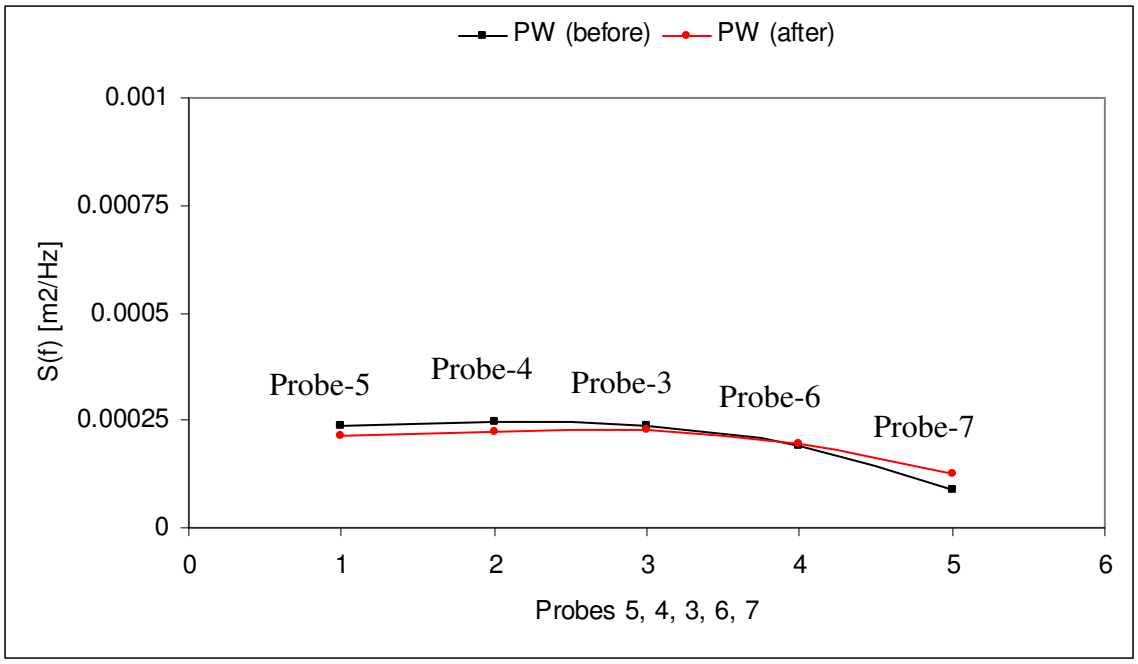

Fig. 31*c*: Cross-tank energy distribution for isolated principal waves
M4-2: REGP4_H0P06_T3P116

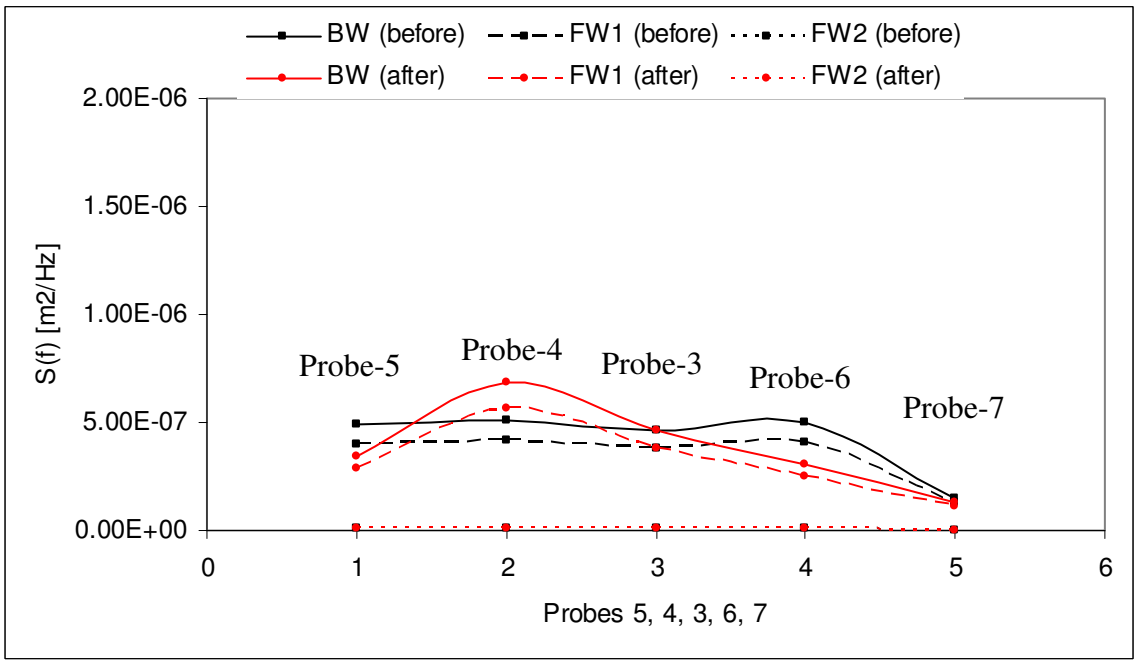

Fig. 31*d*: Cross-tank energy distribution for isolated second-order waves
M4-2: REGP4_H0P06_T3P116

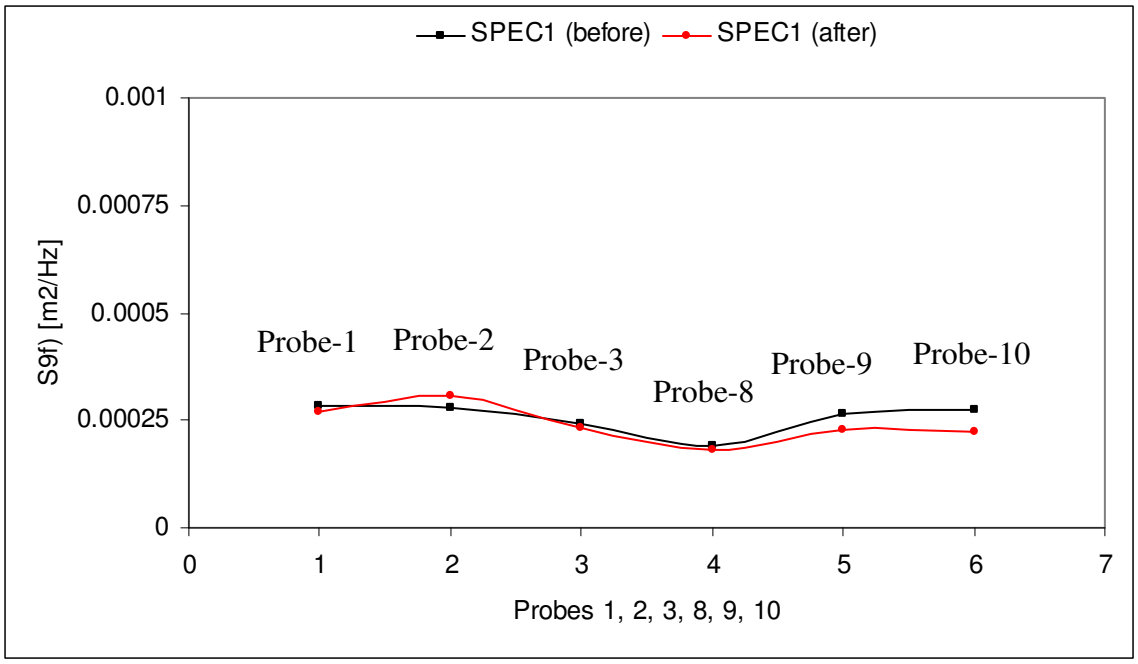

Fig. 31*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-2: REGP4_H0P06_T3P116

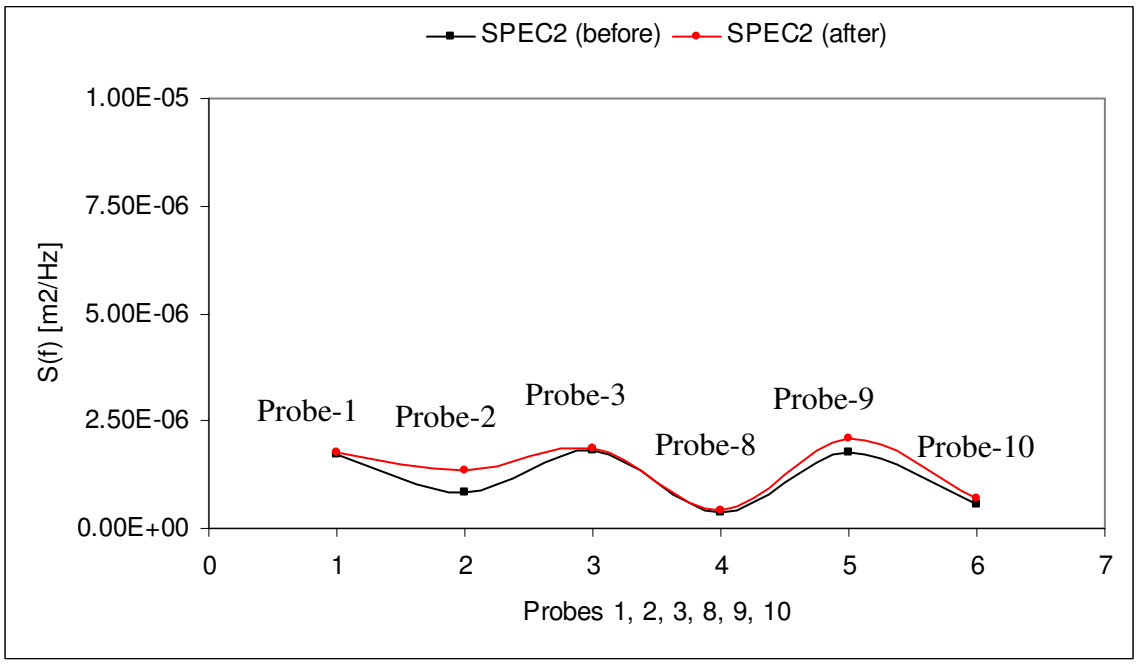

Fig. 31*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-2: REGP4_H0P06_T3P116

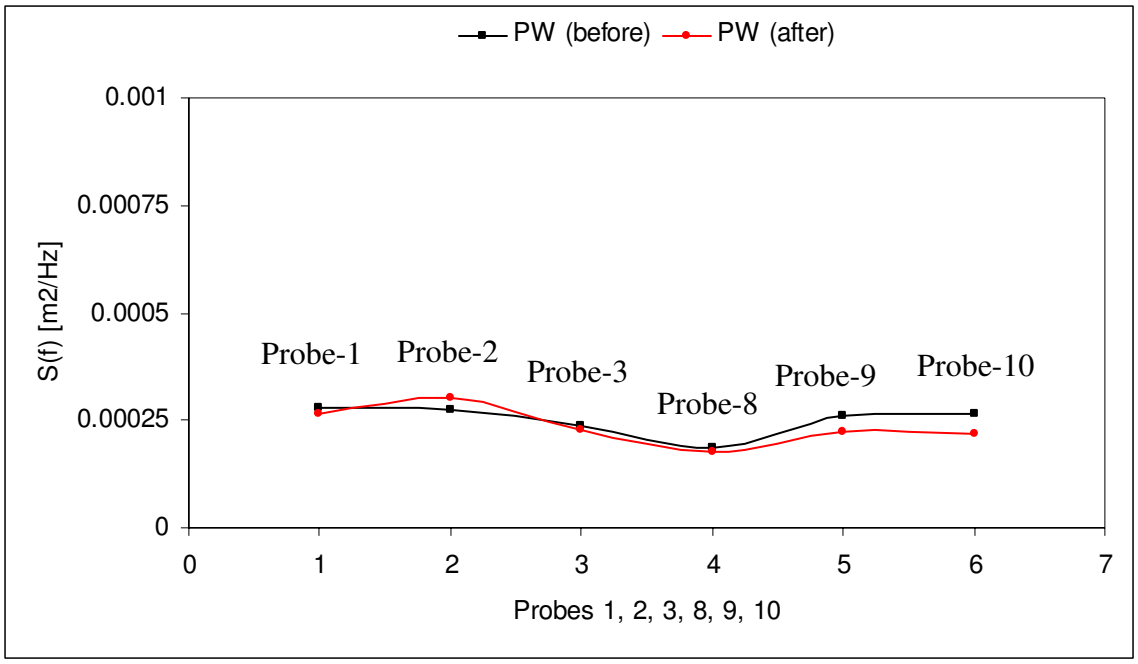

Fig. 31*g*: Along-tank energy distribution for isolated principal waves
M4-2: REGP4_H0P06_T3P116

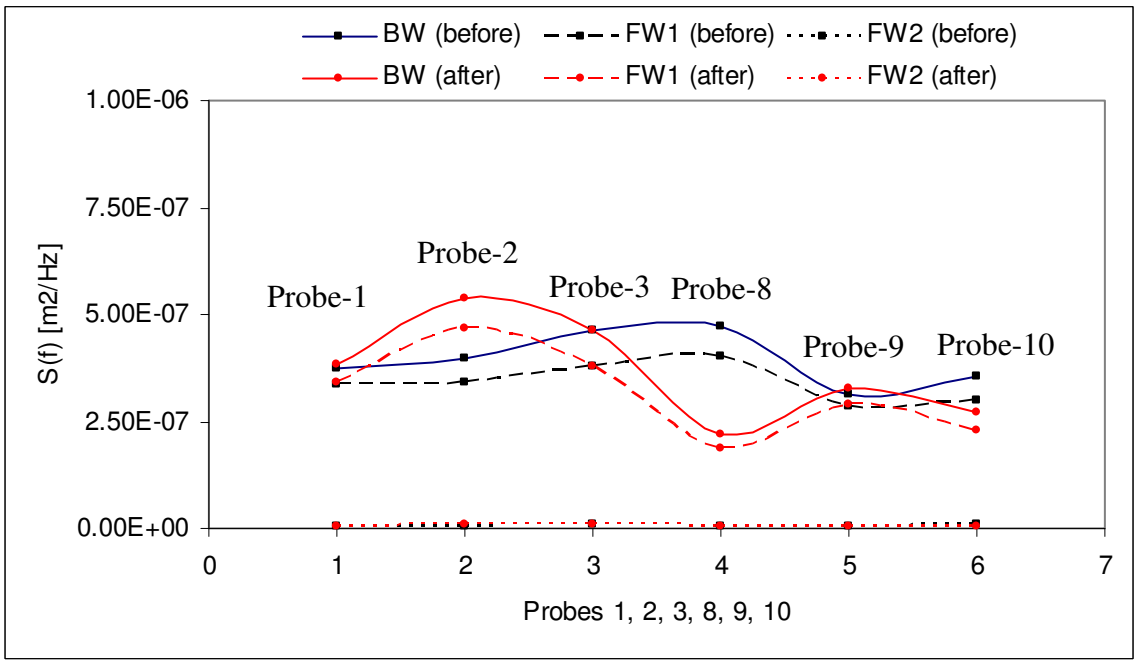

Fig. 31*h*: Along-tank energy distribution for isolated second-order waves
M4-2: REGP4_H0P06_T3P116

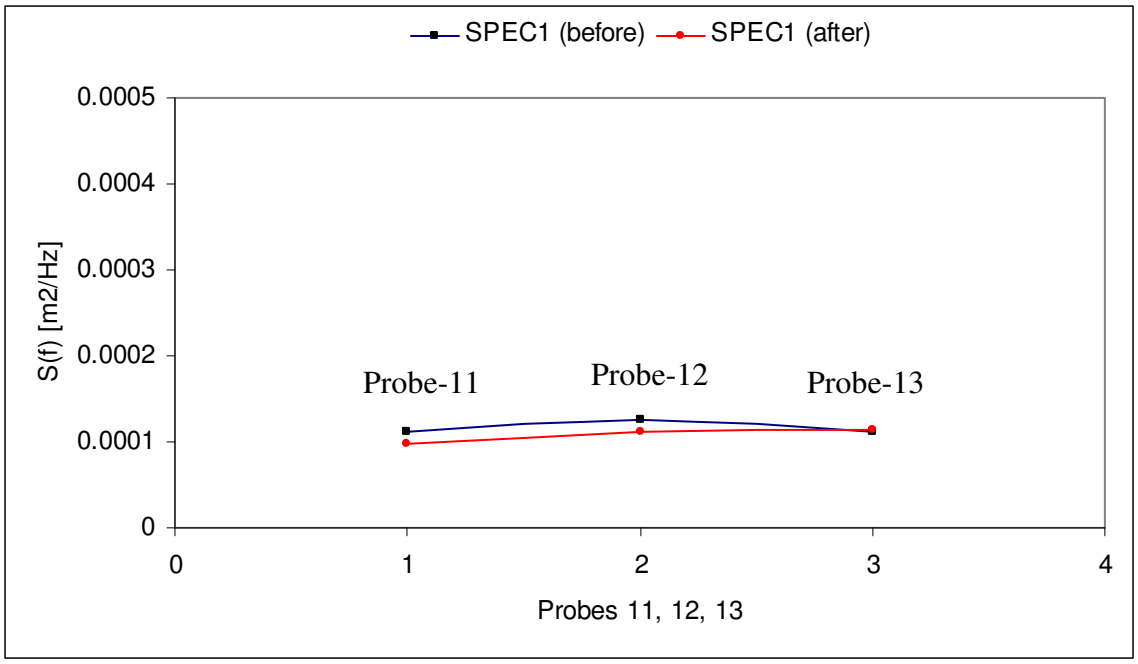

Fig. 31*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-2: REGP4_H0P06_T3P116

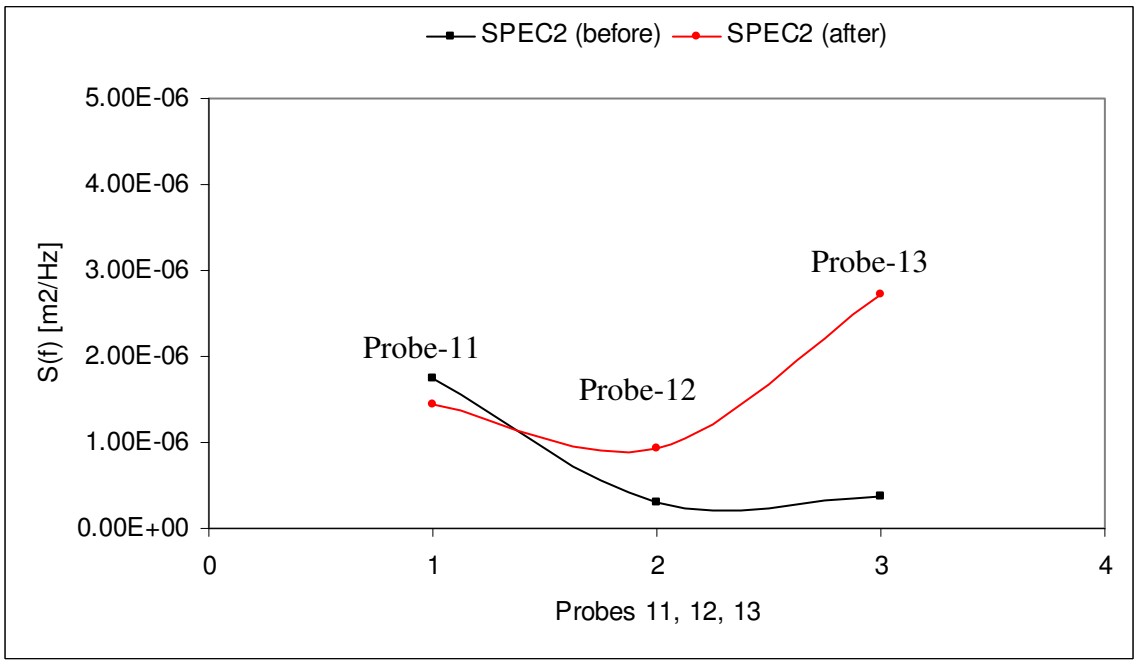

Fig. 31*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-2: REGP4_H0P06_T3P116

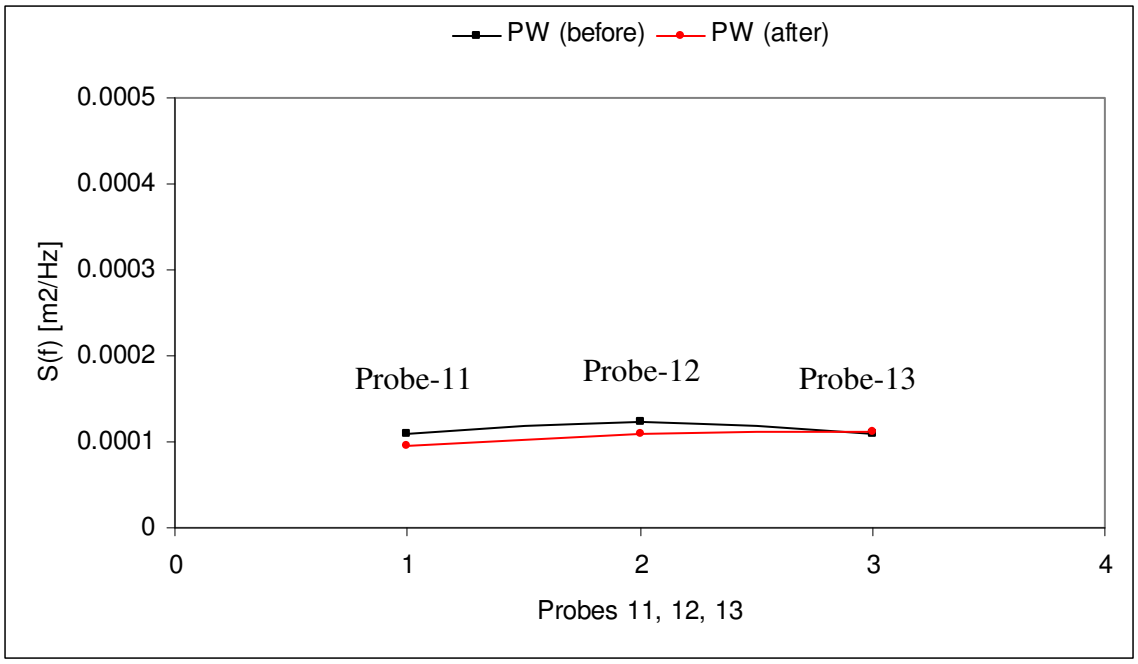

Fig. 31*k*: Cross-tank energy distribution for isolated principal waves
M4-2: REGP4_H0P06_T3P116

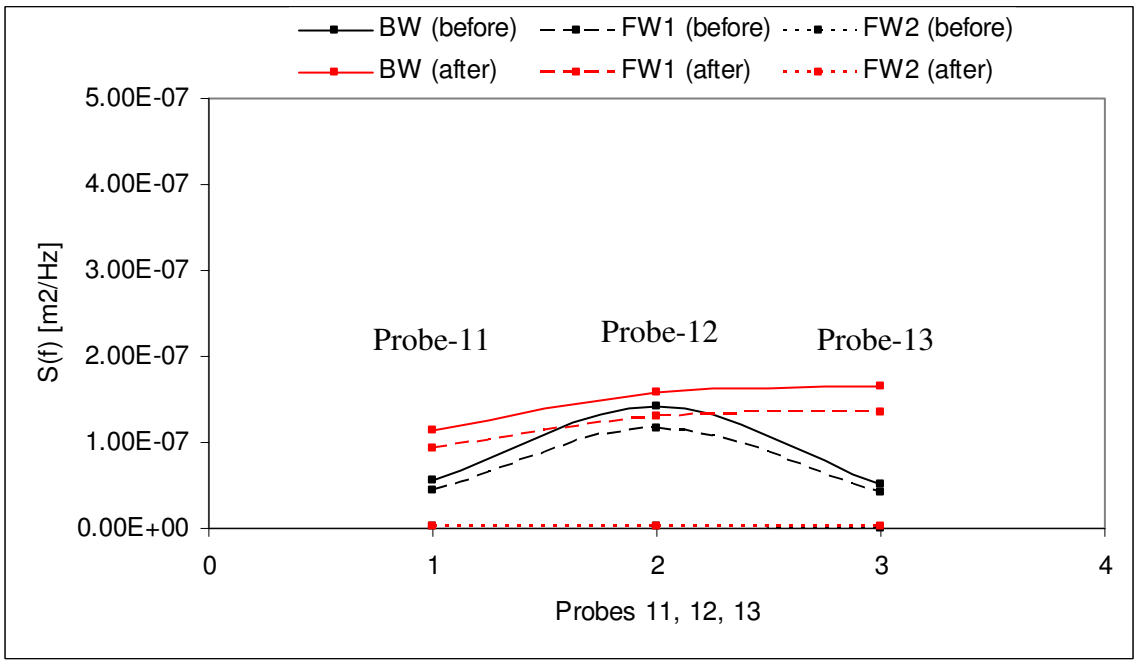

Fig. 31*l*: Cross-tank energy distribution for isolated second-order waves
M4-2: REGP4_H0P06_T3P116

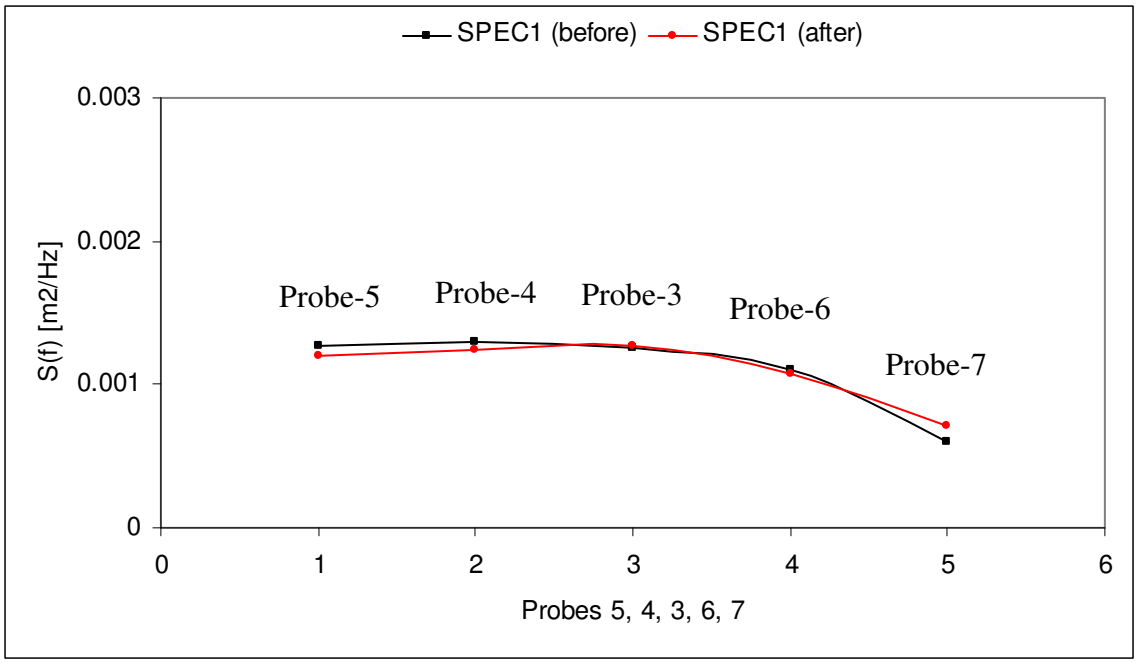

Fig. 32*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-3: REGP4_H0P12_T3P116

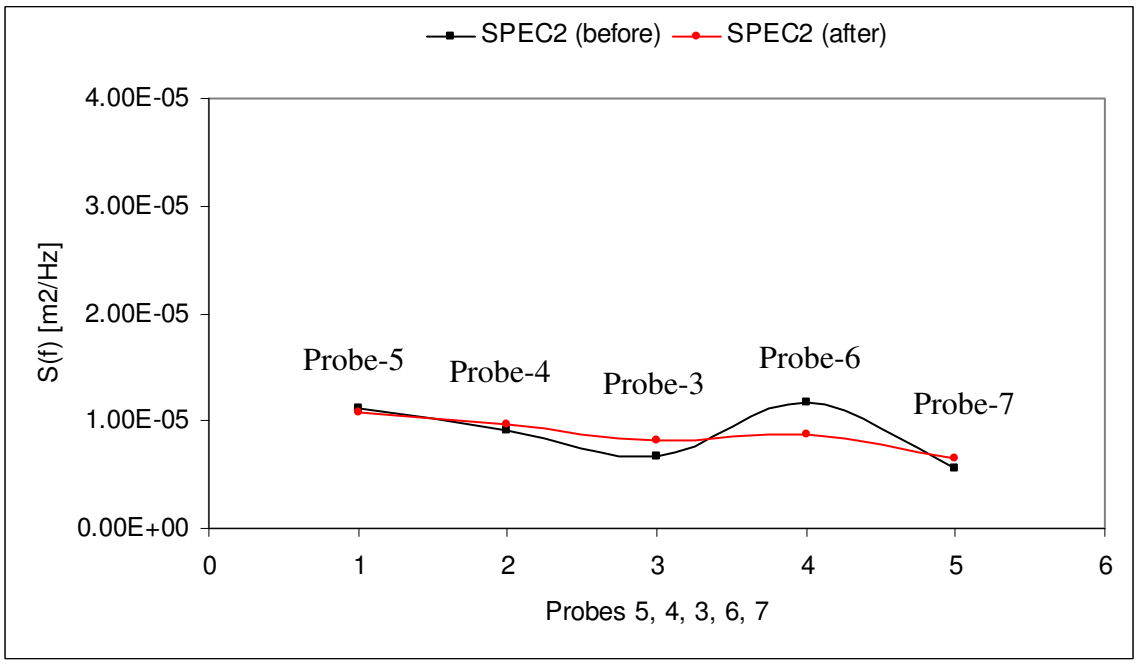

Fig. 32*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-3: REGP4_H0P12_T3P116

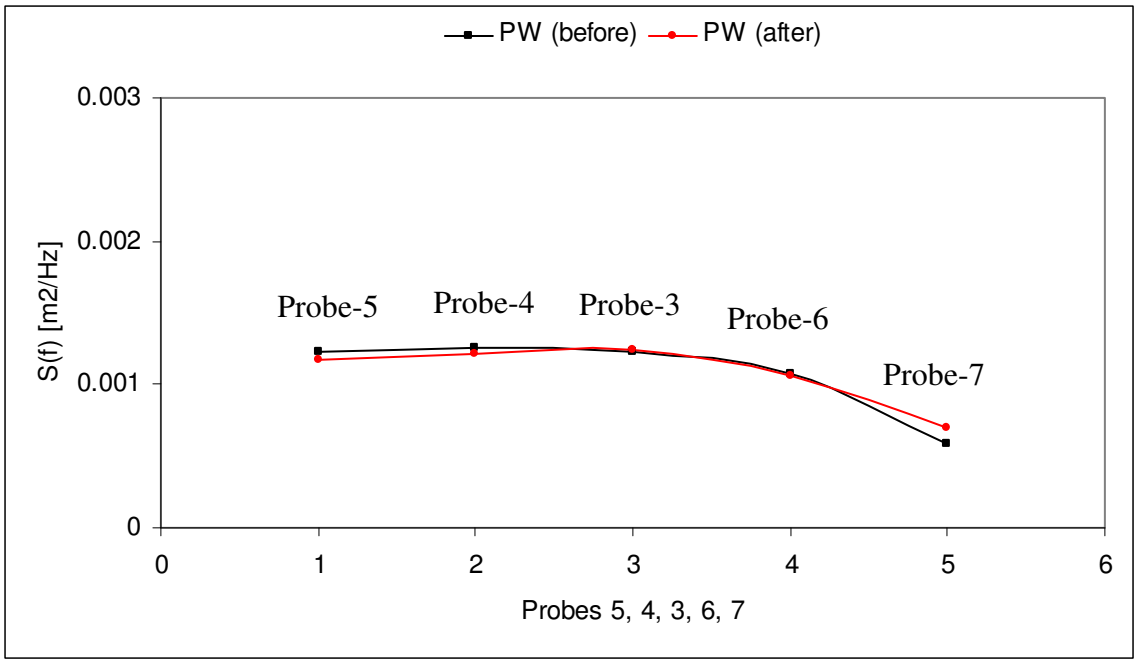

Fig. 32*c*: Cross-tank energy distribution for isolated principal waves
M4-3: REGP4_H0P12_T3P116

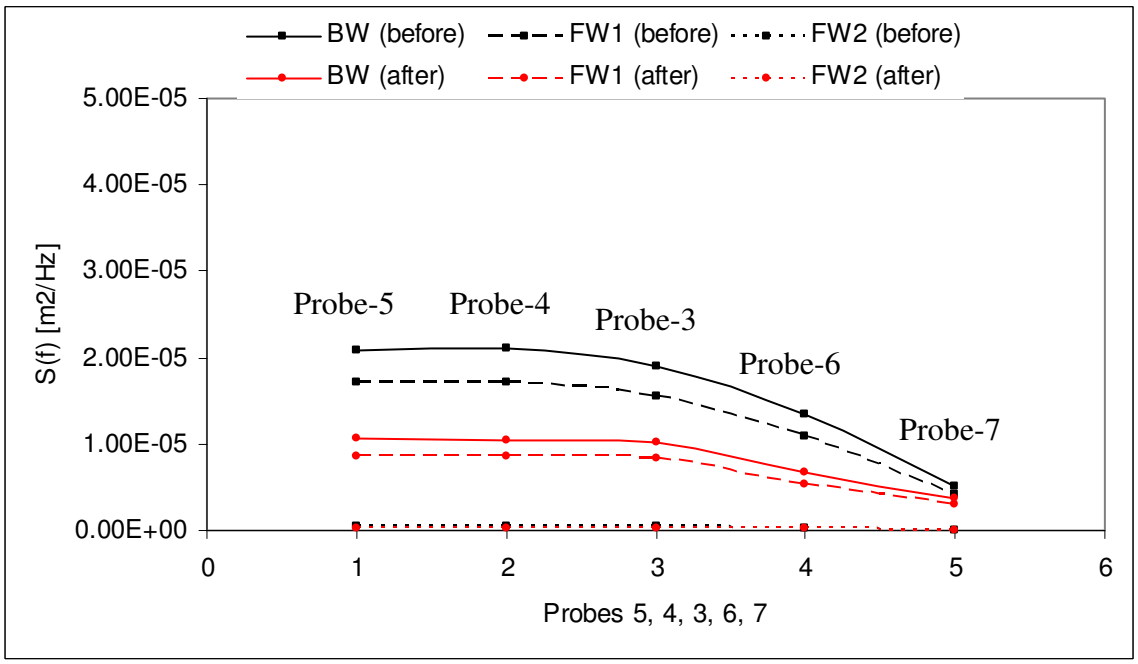

Fig. 32*d*: Cross-tank energy distribution for isolated second-order waves
M4-3: REGP4_H0P12_T3P116

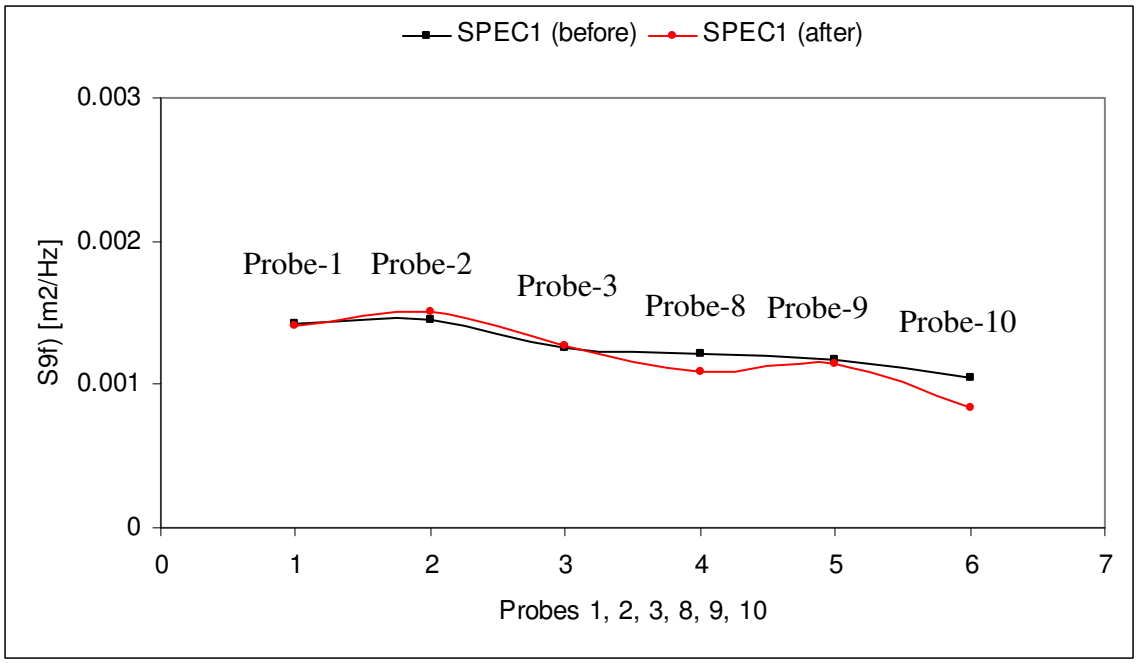

Fig. 32*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-3: REGP4_H0P12_T3P116

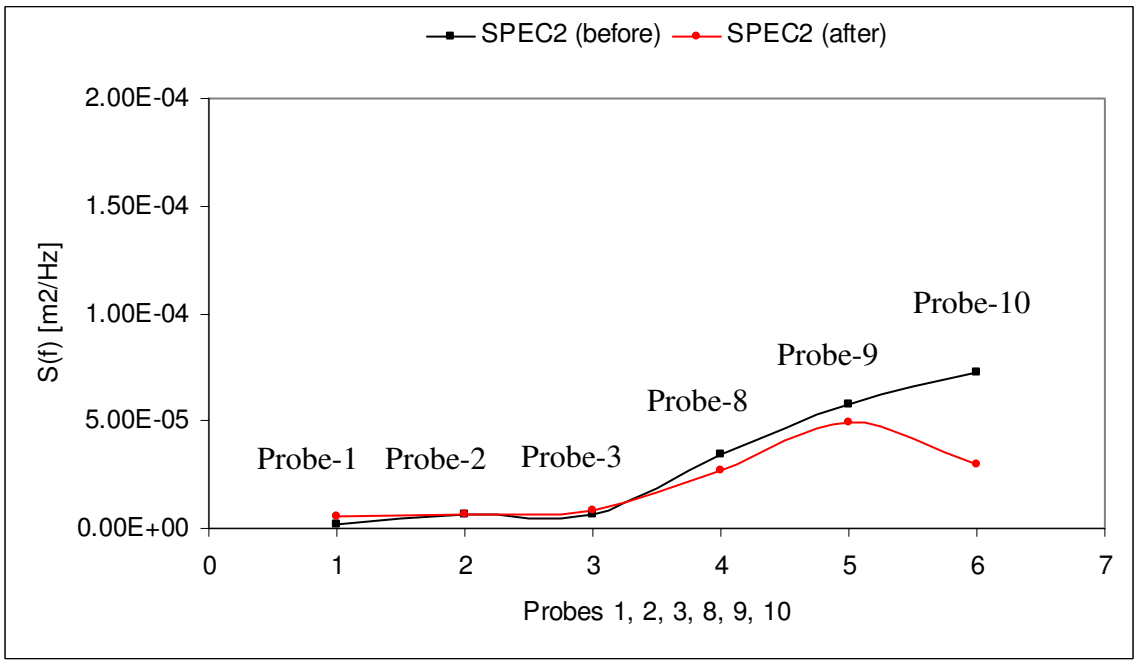

Fig. 32*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-3: REGP4_H0P12_T3P116

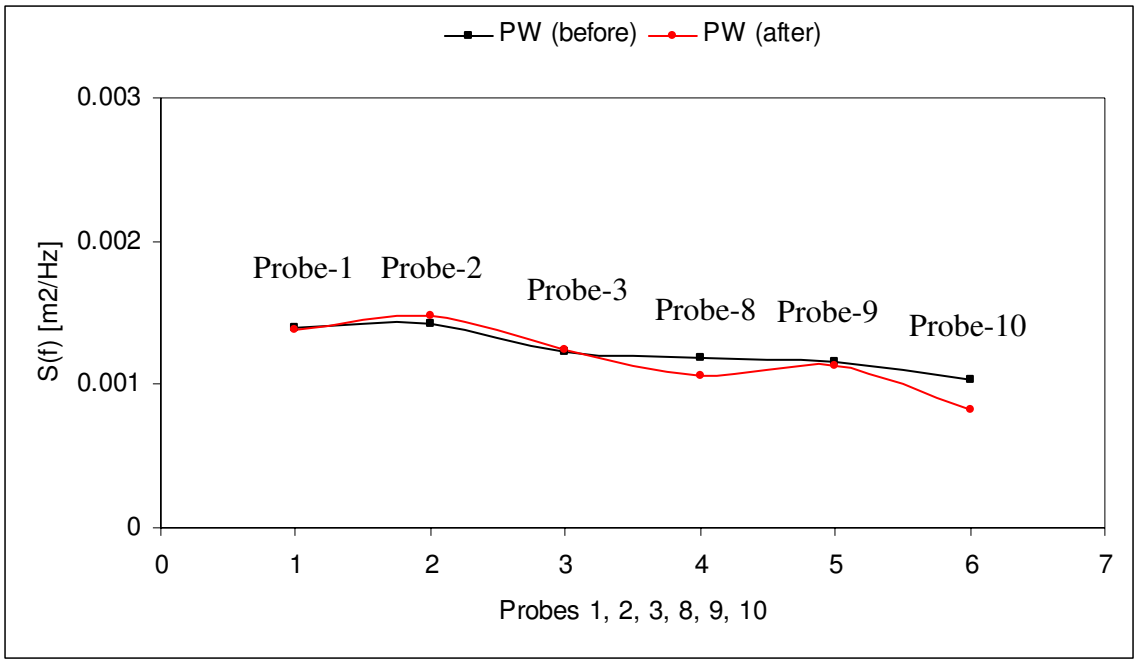

Fig. 32*g*: Along-tank energy distribution for isolated principal waves
M4-3: REGP4_H0P12_T3P116

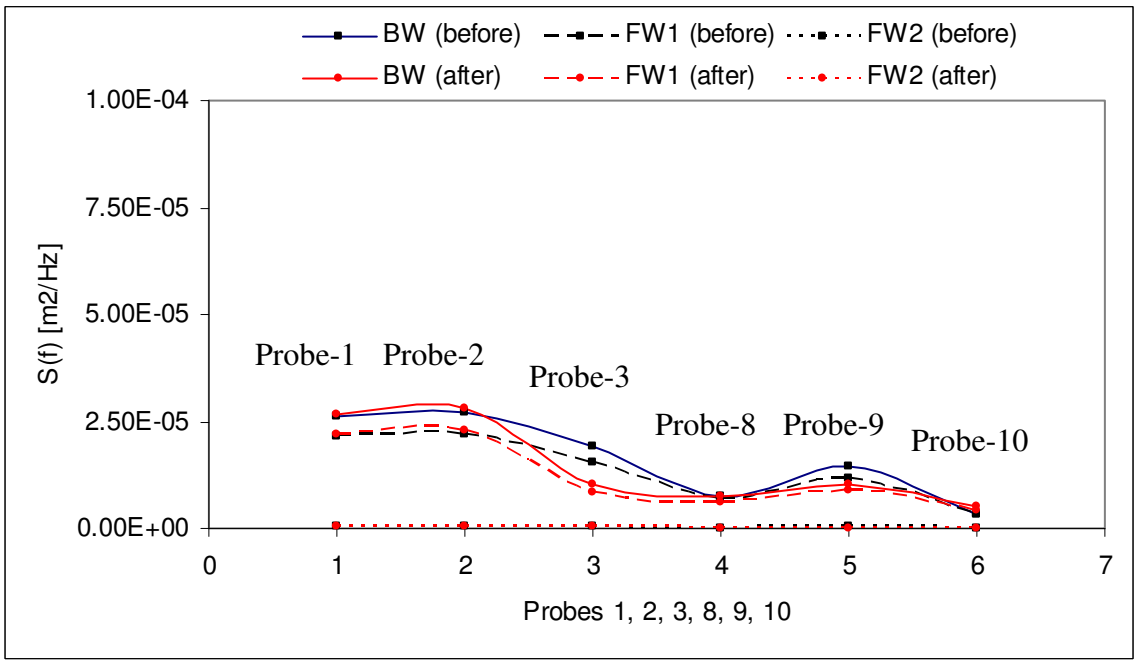

Fig. 32*h*: Along-tank energy distribution for isolated second-order waves
M4-3: REGP4_H0P12_T3P116

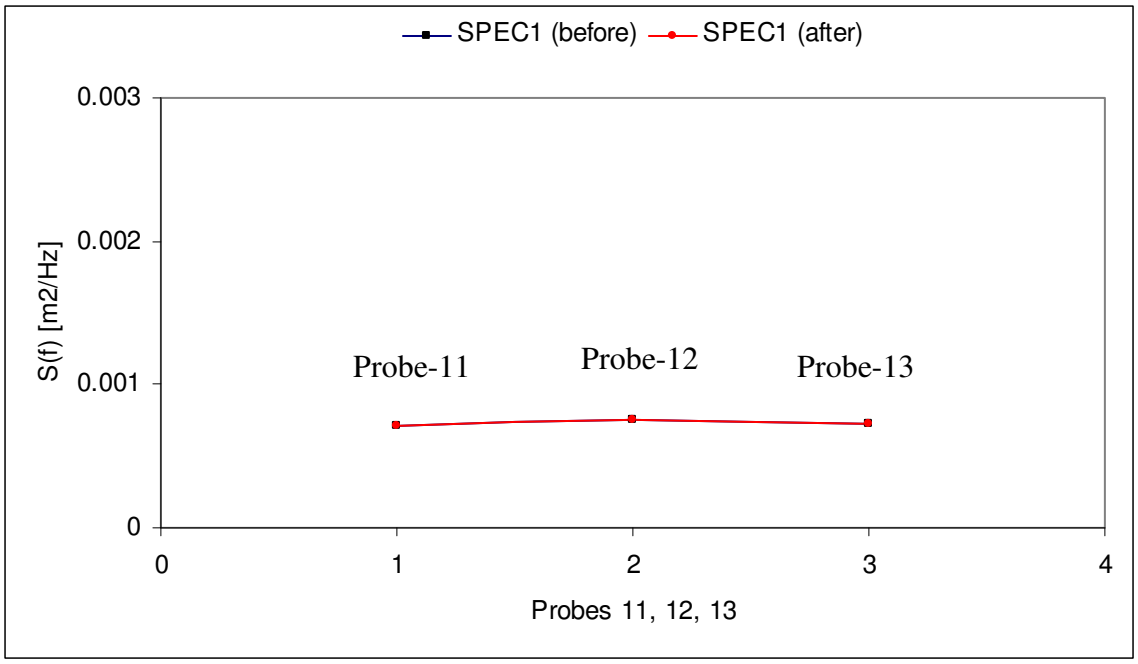

Fig. 32*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-3: REGP4_H0P12_T3P116

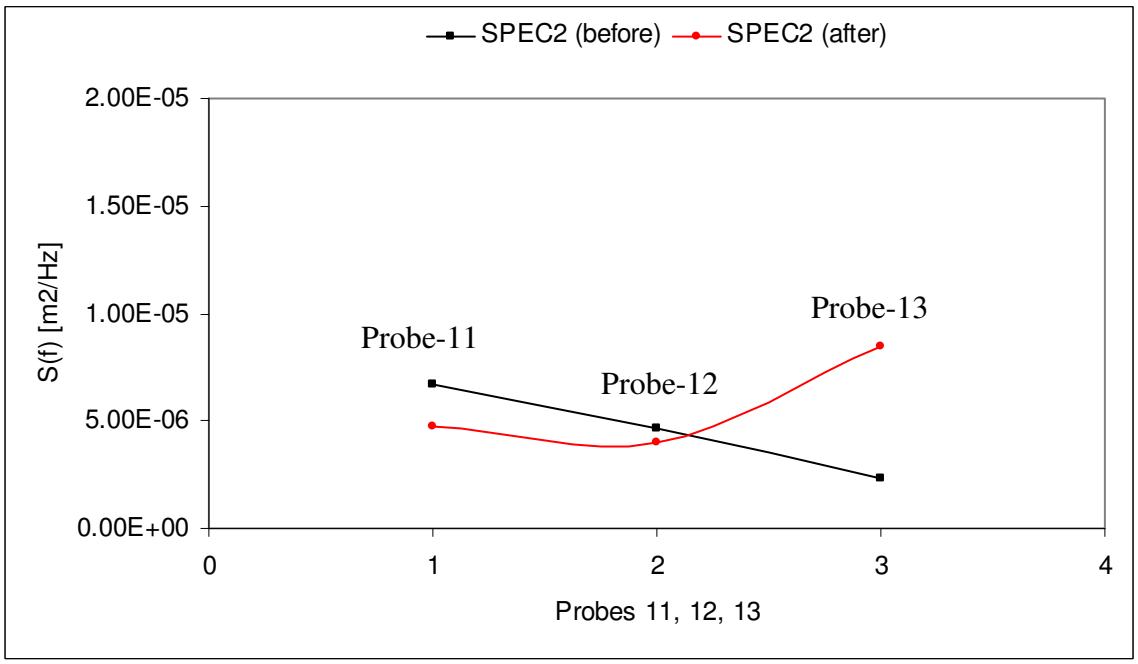

Fig. 32*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-3: REGP4_H0P12_T3P116

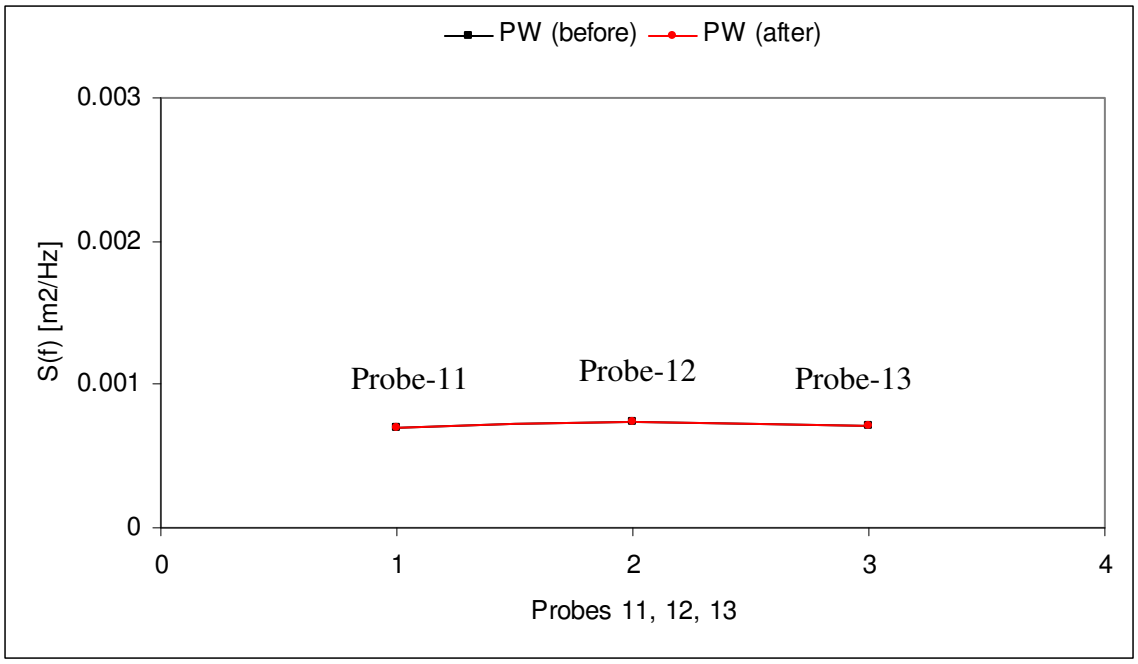

Fig. 32*k*: Cross-tank energy distribution for isolated principal waves
M4-3: REGP4_H0P12_T3P116

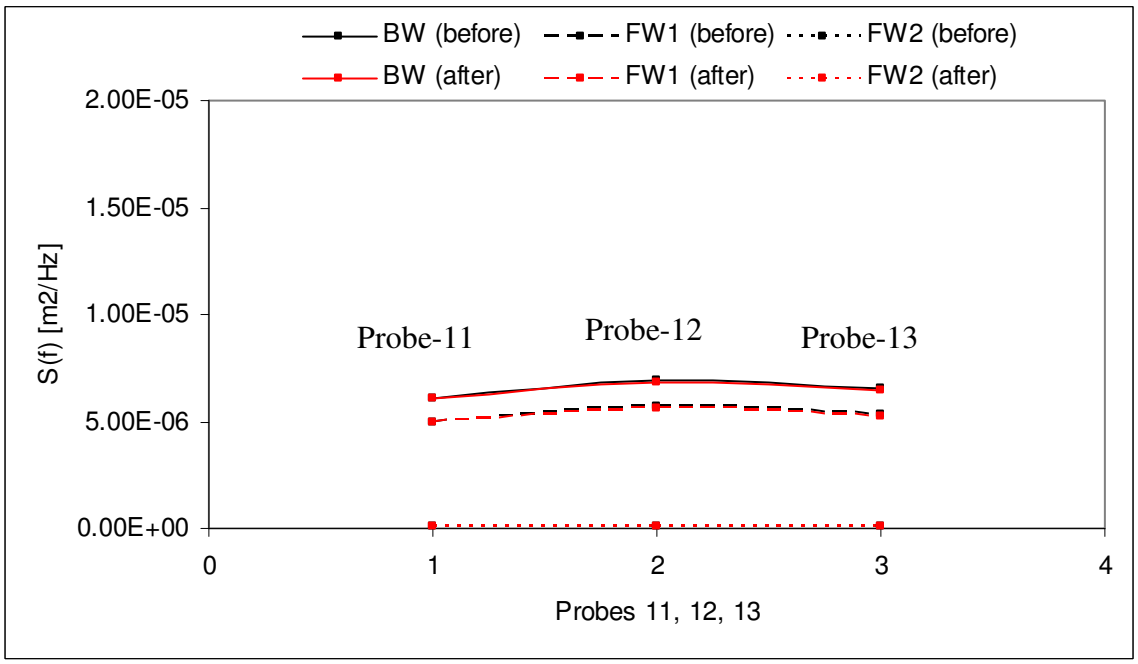

Fig. 32*l*: Cross-tank energy distribution for isolated second-order waves
M4-3: REGP4_H0P12_T3P116

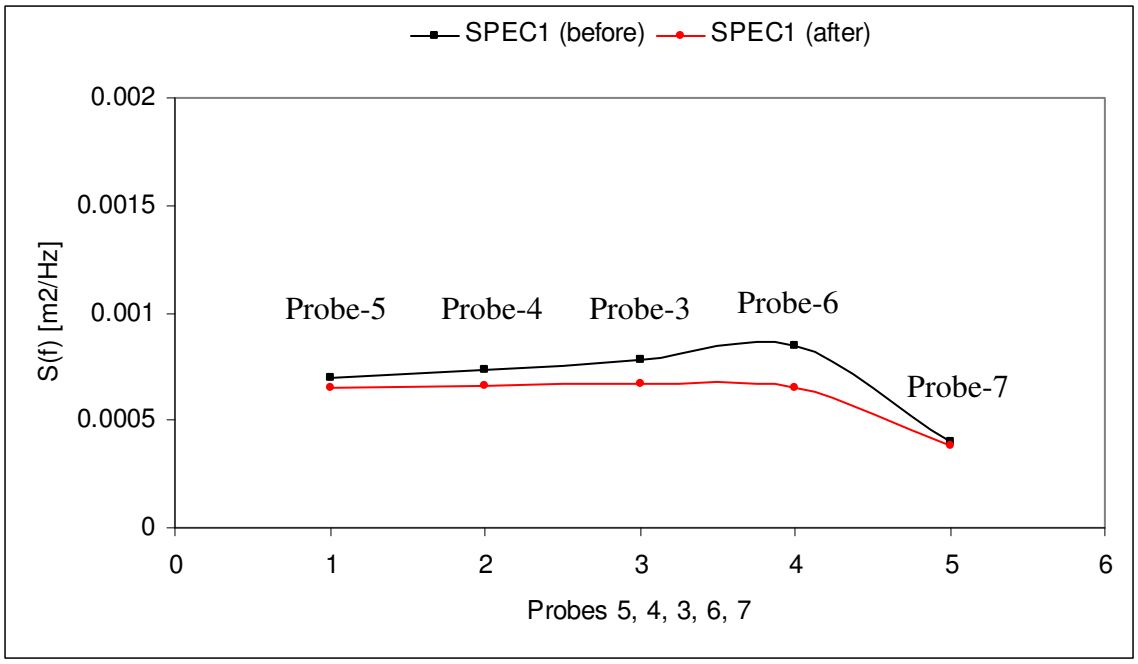

Fig. 33*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-4: REGP4_H0P08_T4P105

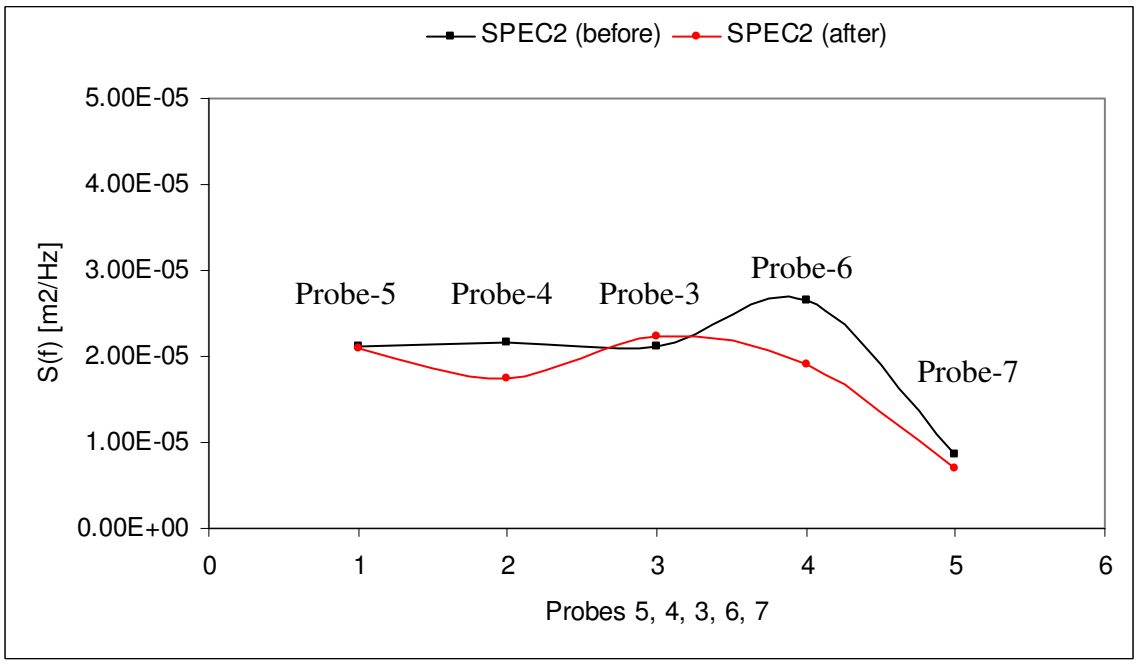

Fig. 33*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-4: REGP4_H0P08_T4P105

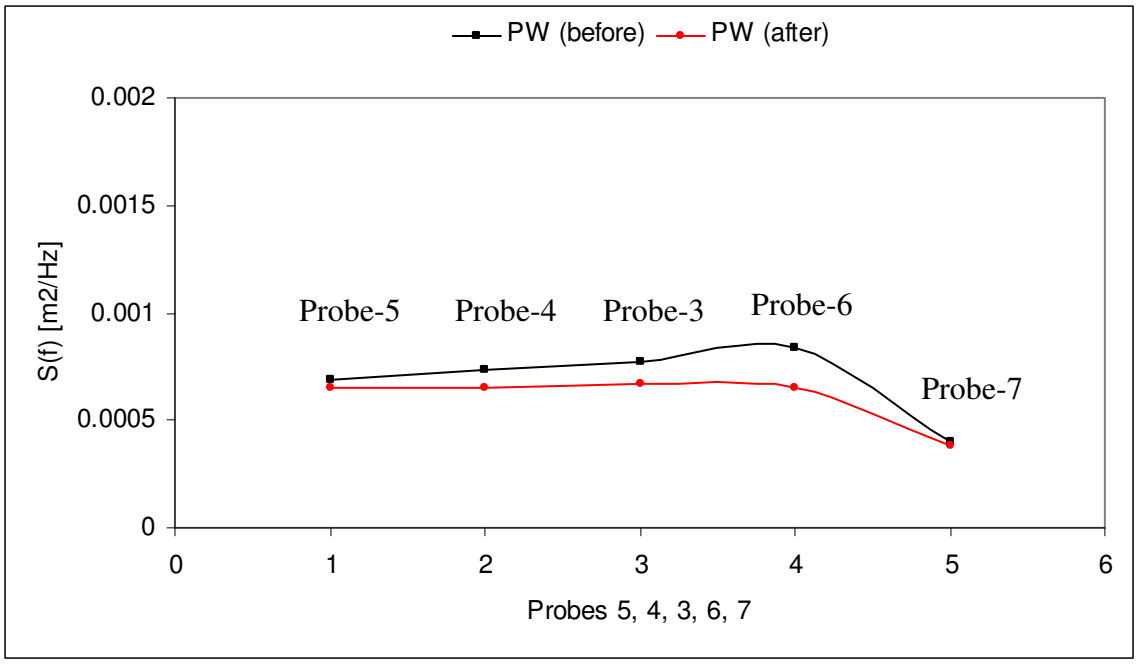

Fig. 33*c*: Cross-tank energy distribution for isolated principal waves
M4-4: REGP4_H0P08_T4P105

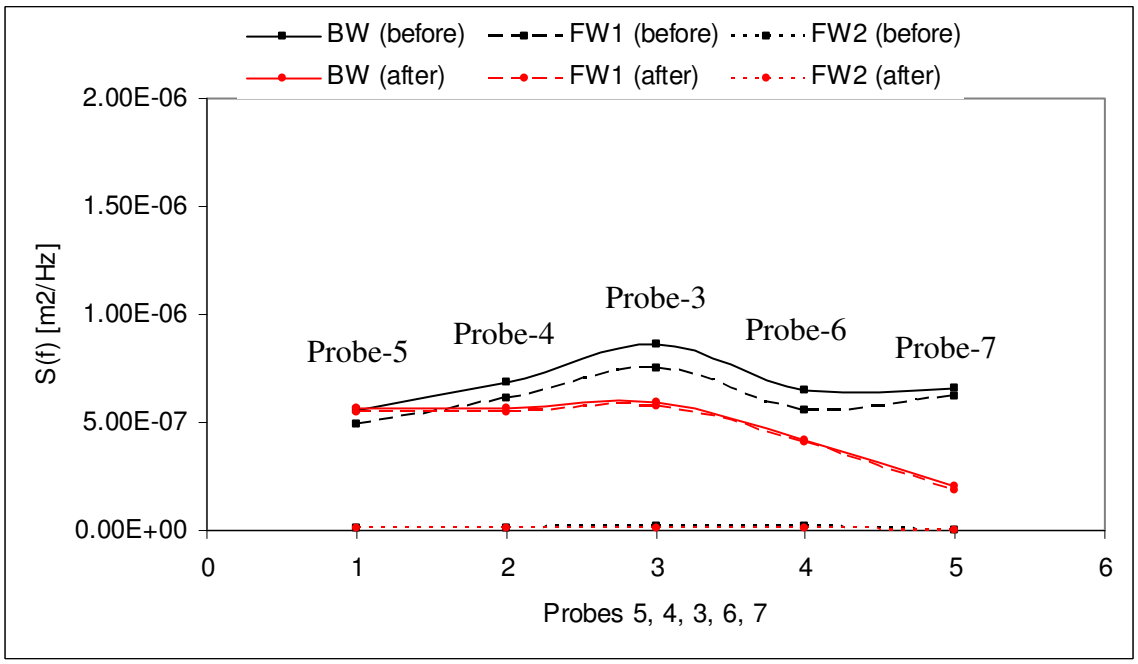

Fig. 33*d*: Cross-tank energy distribution for isolated second-order waves
M4-4: REGP4_H0P08_T4P105

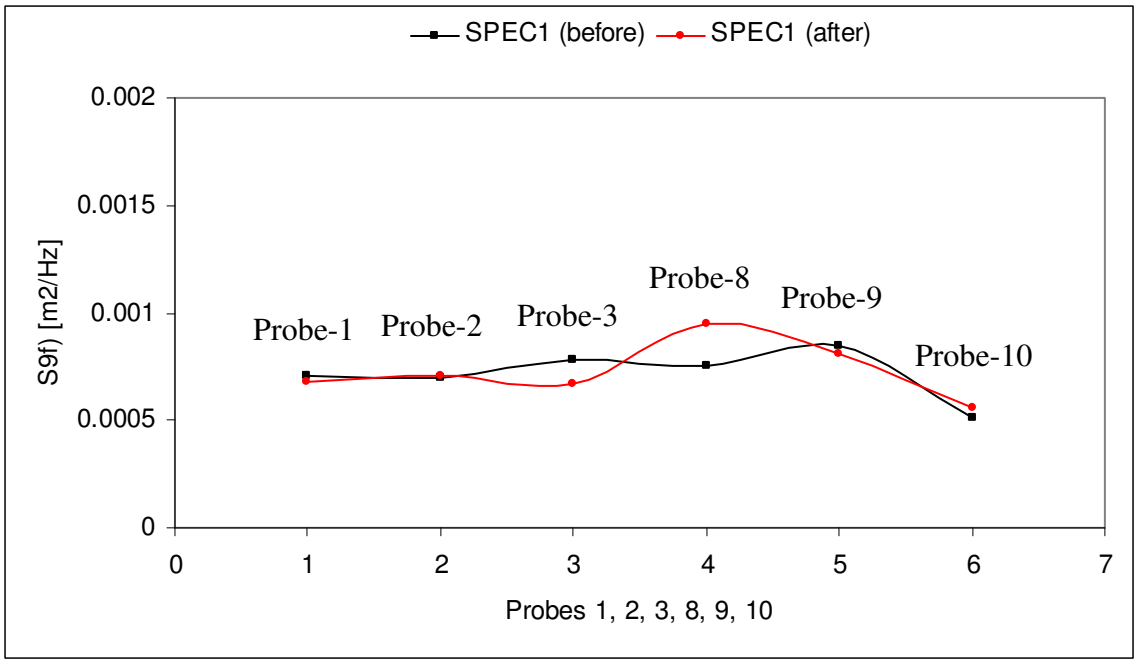

Fig. 33*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-4: REGP4_H0P08_T4P105

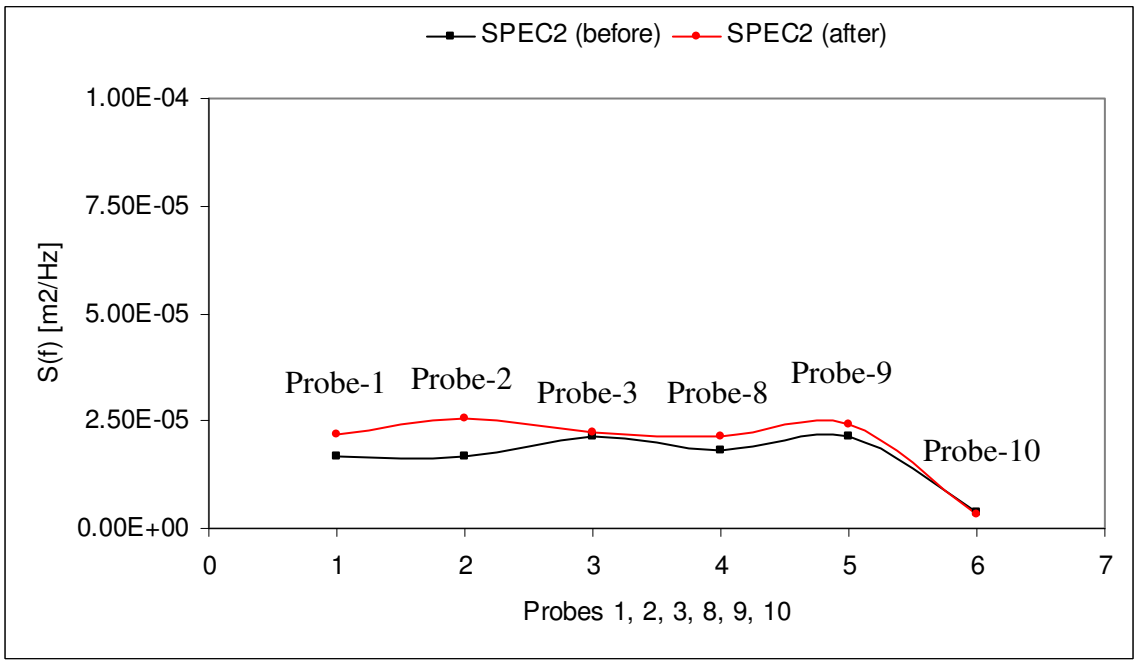

Fig. 33*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-4: REGP4_H0P08_T4P105

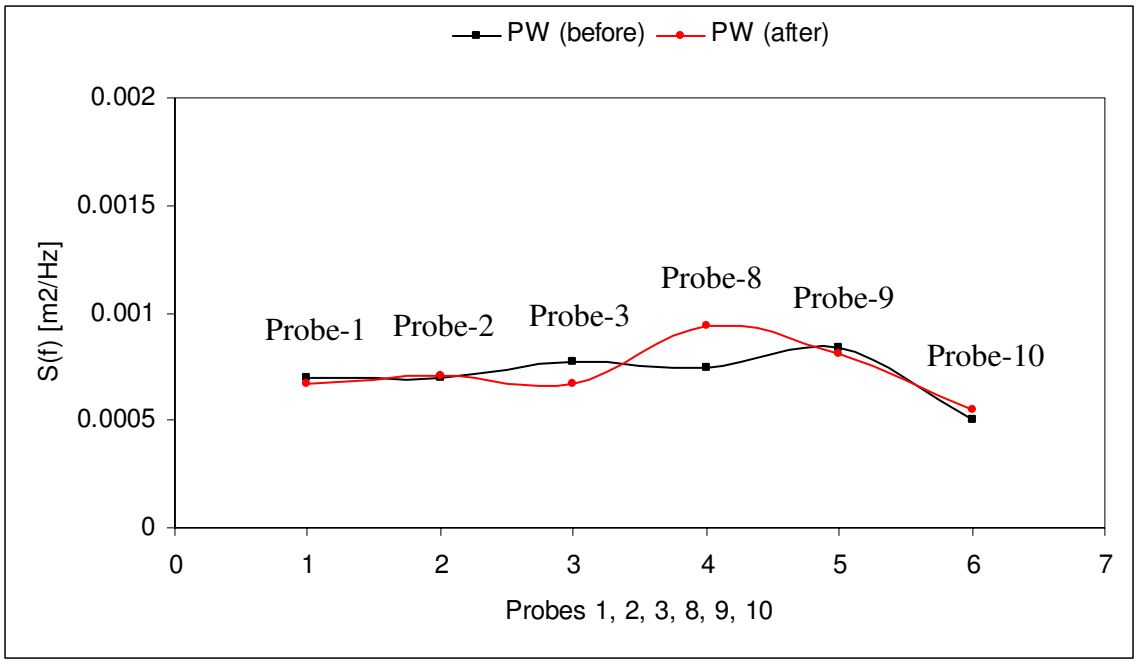

Fig. 33*g*: Along-tank energy distribution for isolated principal waves
M4-4: REGP4_H0P08_T4P105

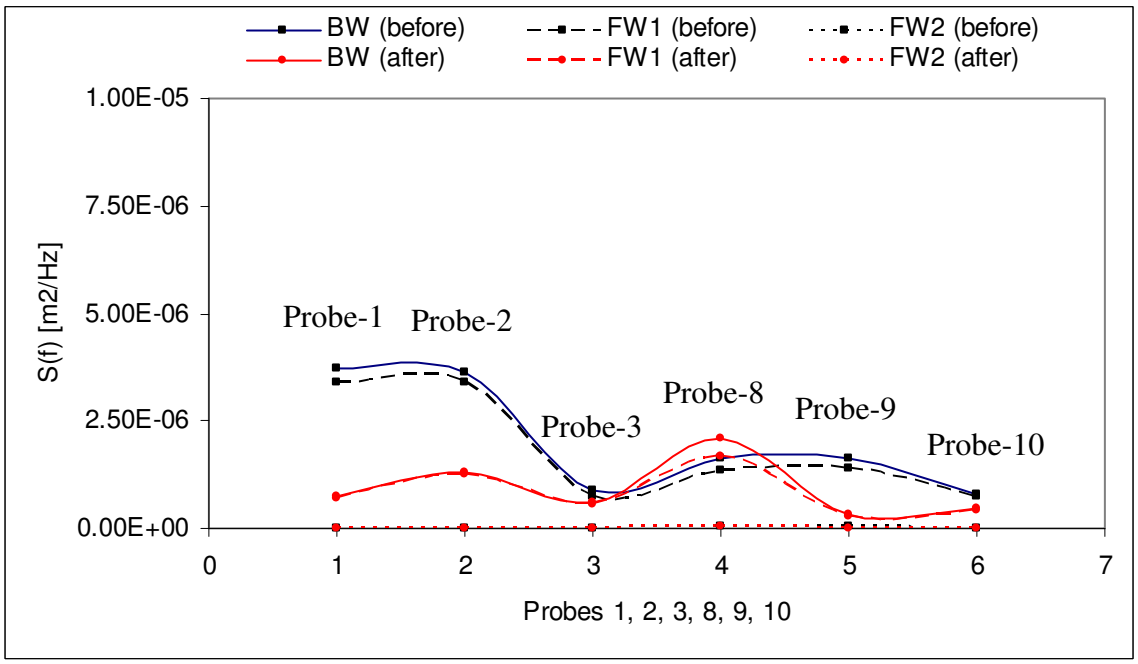

Fig. 33*h*: Along-tank energy distribution for isolated second-order waves
M4-4: REGP4_H0P08_T4P105

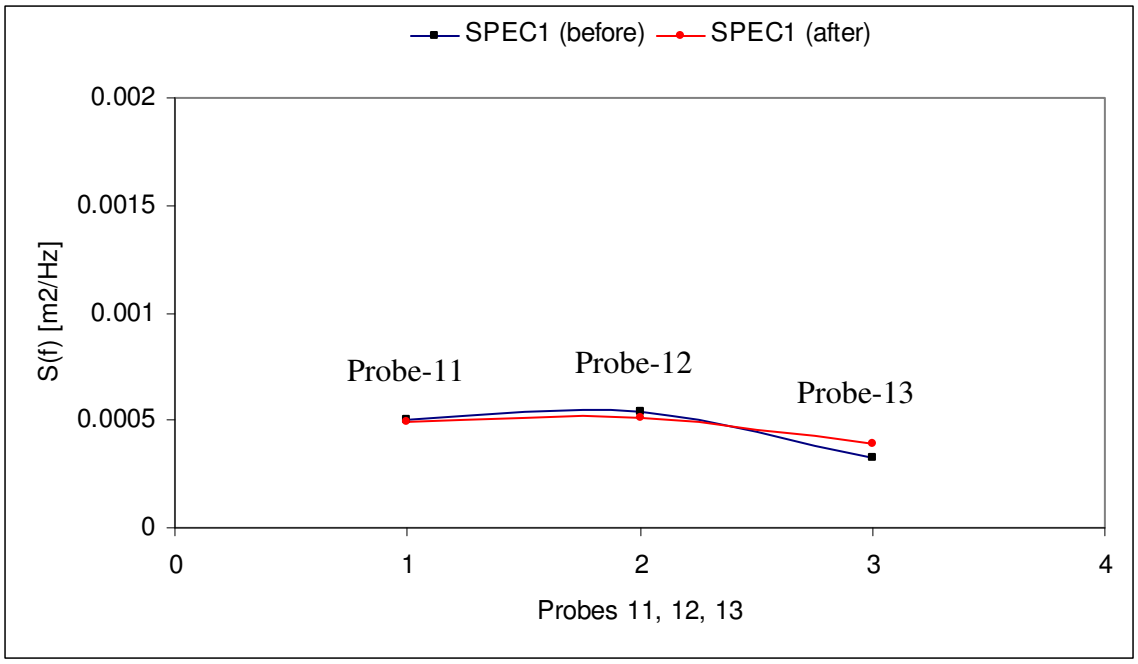

Fig. 33*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-4: REGP4_H0P08_T4P105

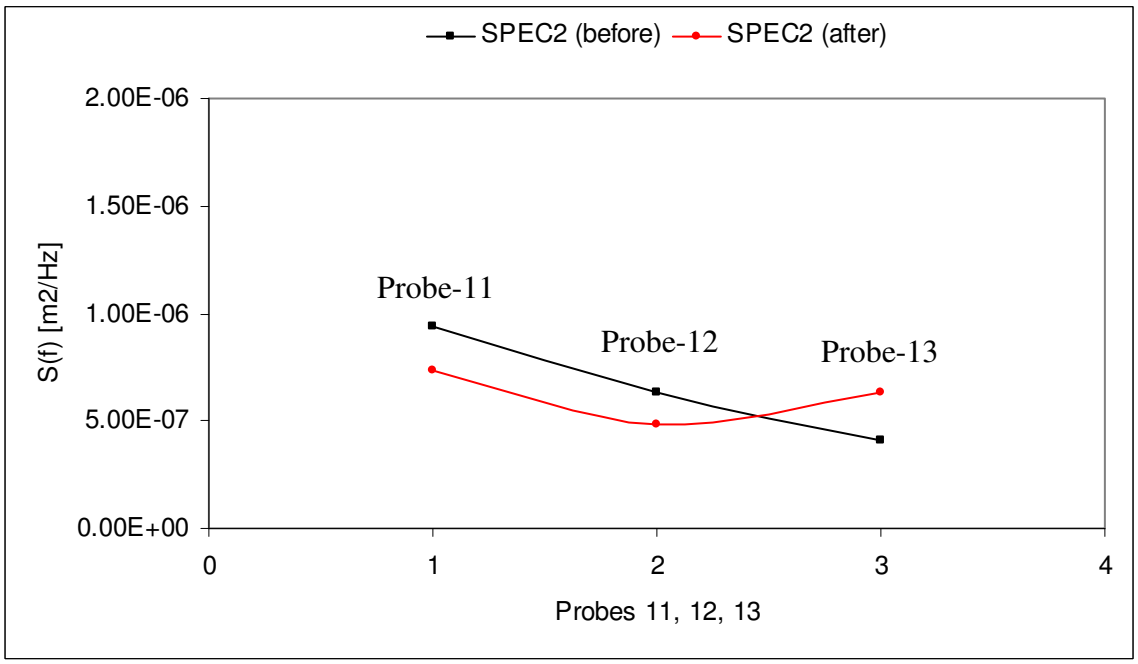

Fig. 33*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-4: REGP4_H0P08_T4P105

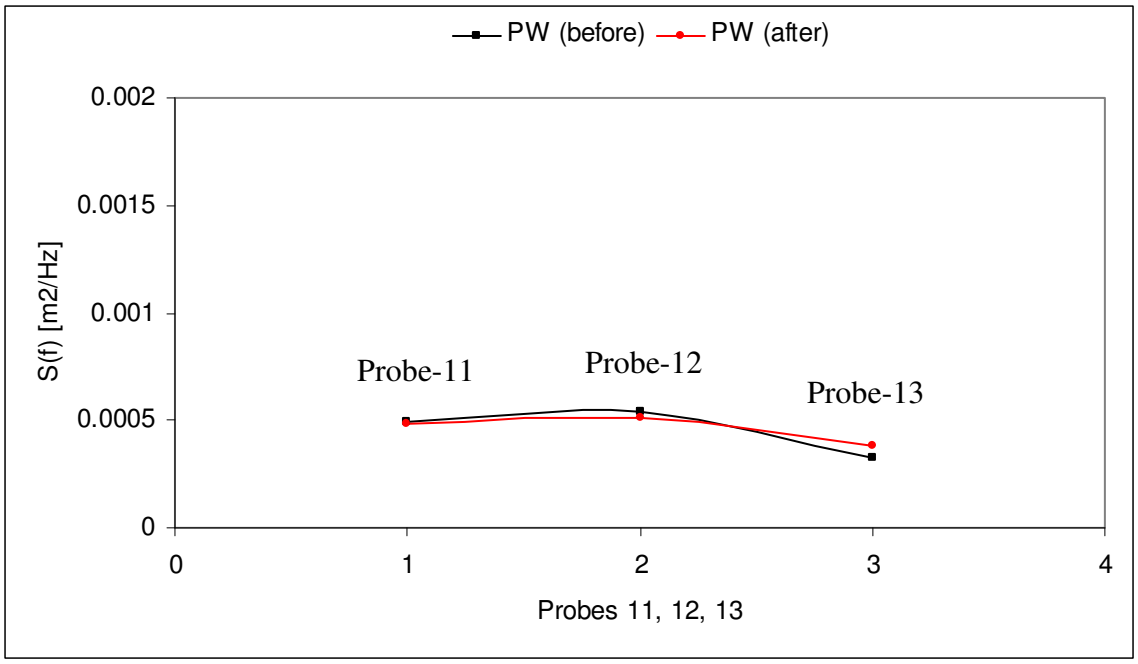

Fig. 33*k*: Cross-tank energy distribution for isolated principal waves
M4-4: REGP4_H0P08_T4P105

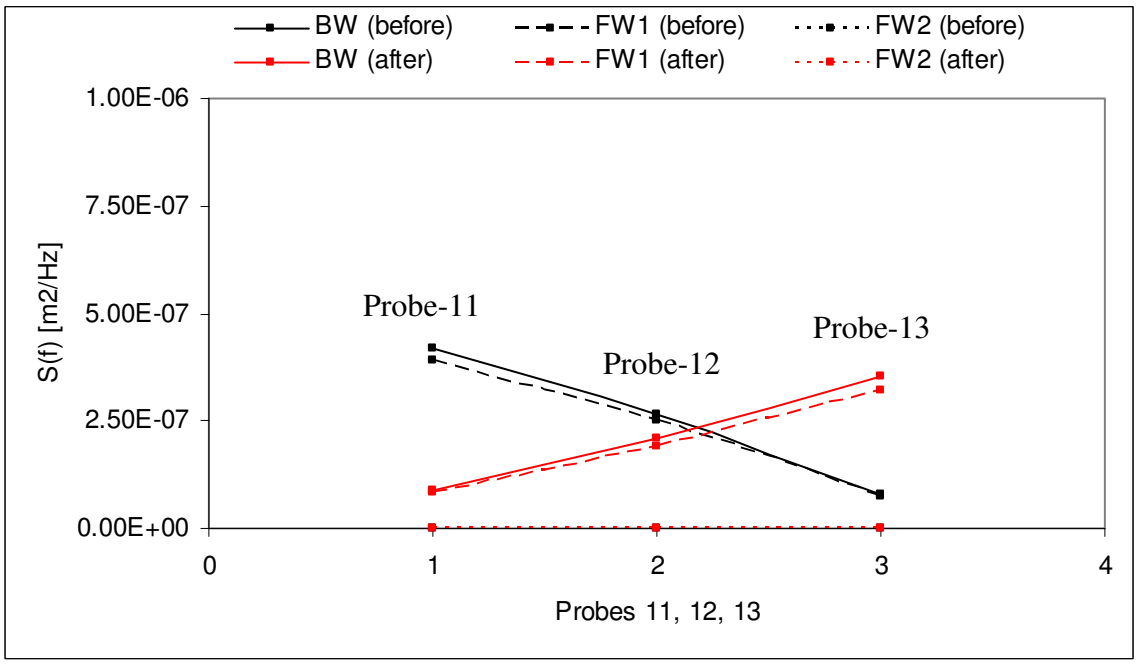

Fig. 33*l*: Cross-tank energy distribution for isolated second-order waves
M4-4: REGP4_H0P08_T4P105

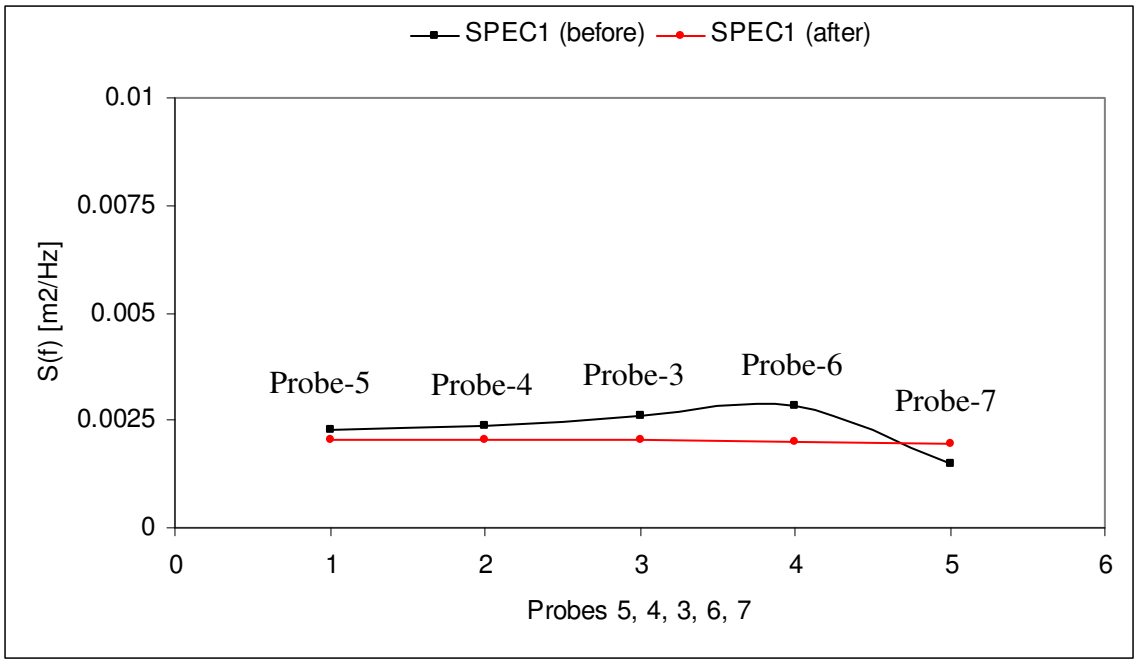

Fig. 34*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-5: REGP4_H0P16_T4P105

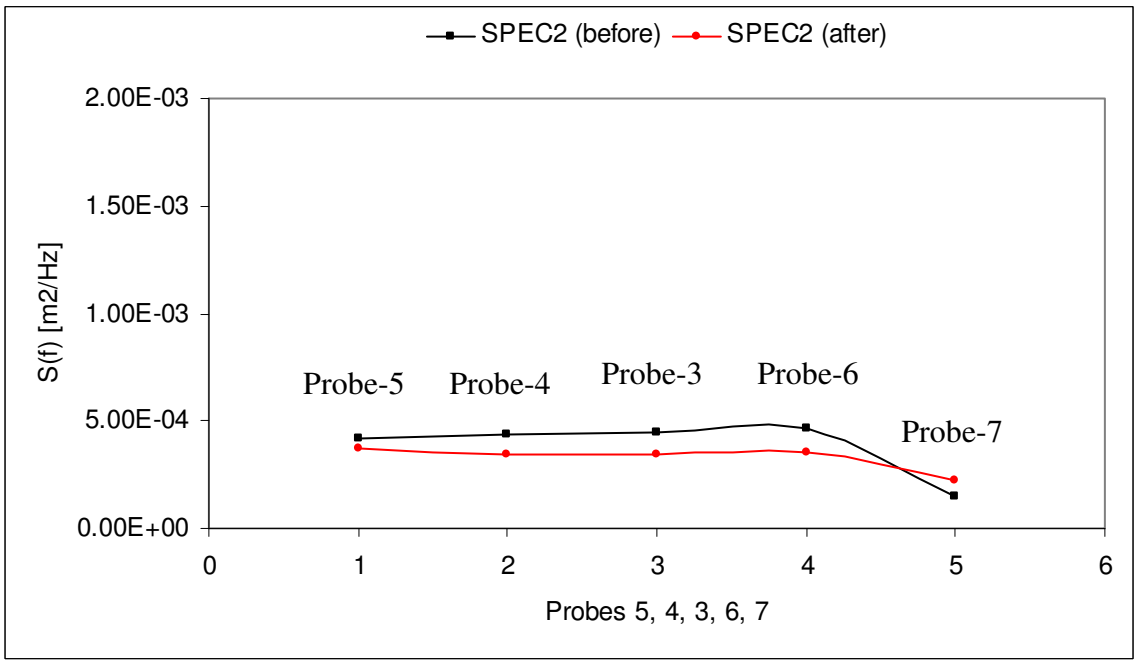

Fig. 34*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-5: REGP4_H0P16_T4P105

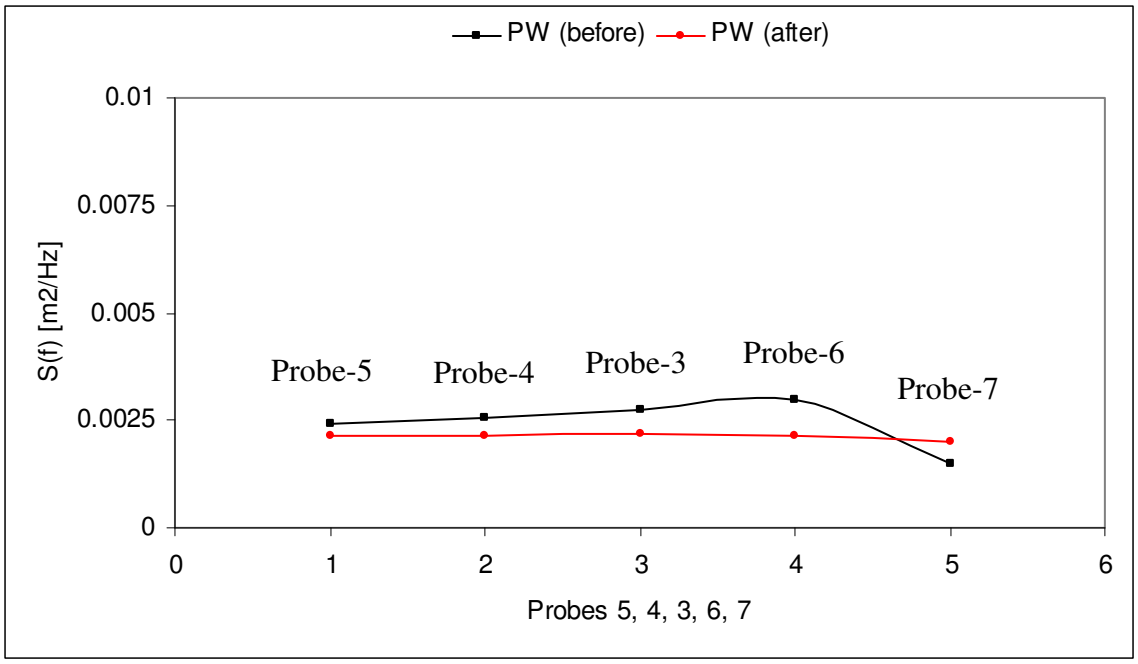

Fig. 34*c*: Cross-tank energy distribution for isolated principal waves
M4-5: REGP4_H0P16_T4P105

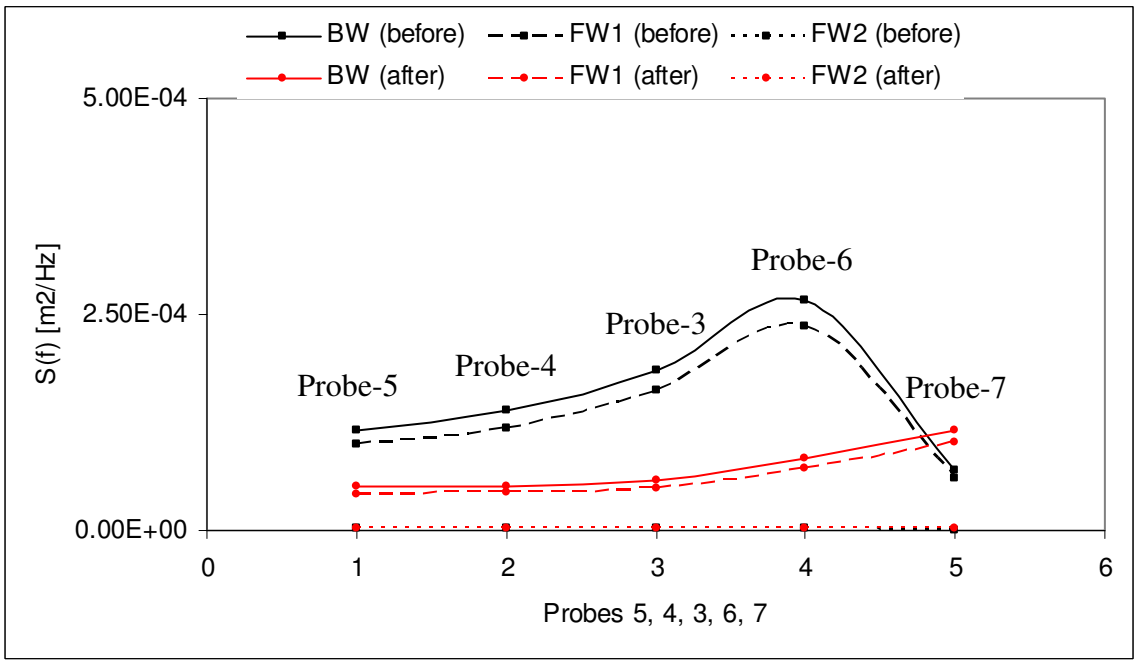

Fig. 34*d*: Cross-tank energy distribution for isolated second-order waves
M4-5: REGP4_H0P16_T4P105

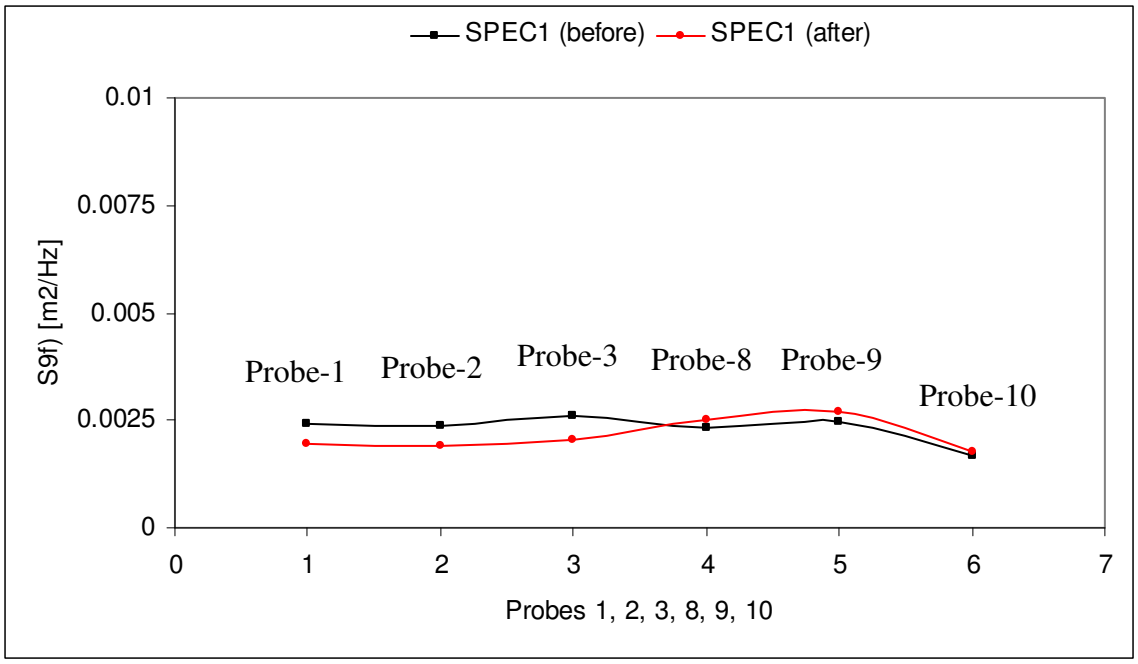

Fig. 34*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-5: REGP4_H0P16_T4P105

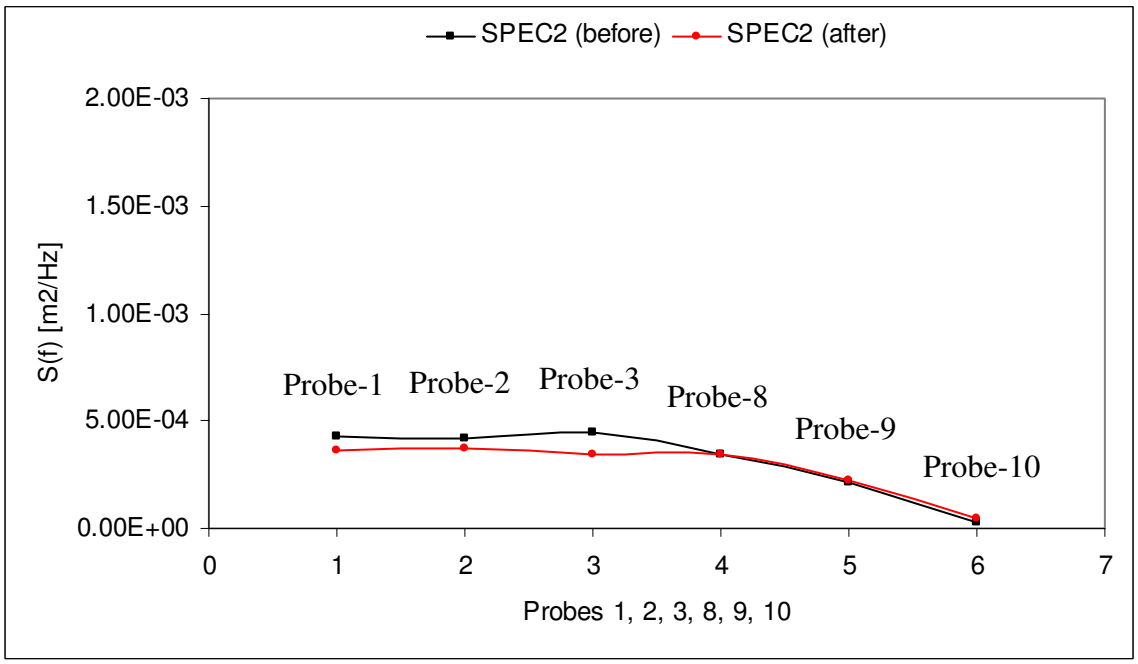

Fig. 34*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-5: REGP4_H0P16_T4P105

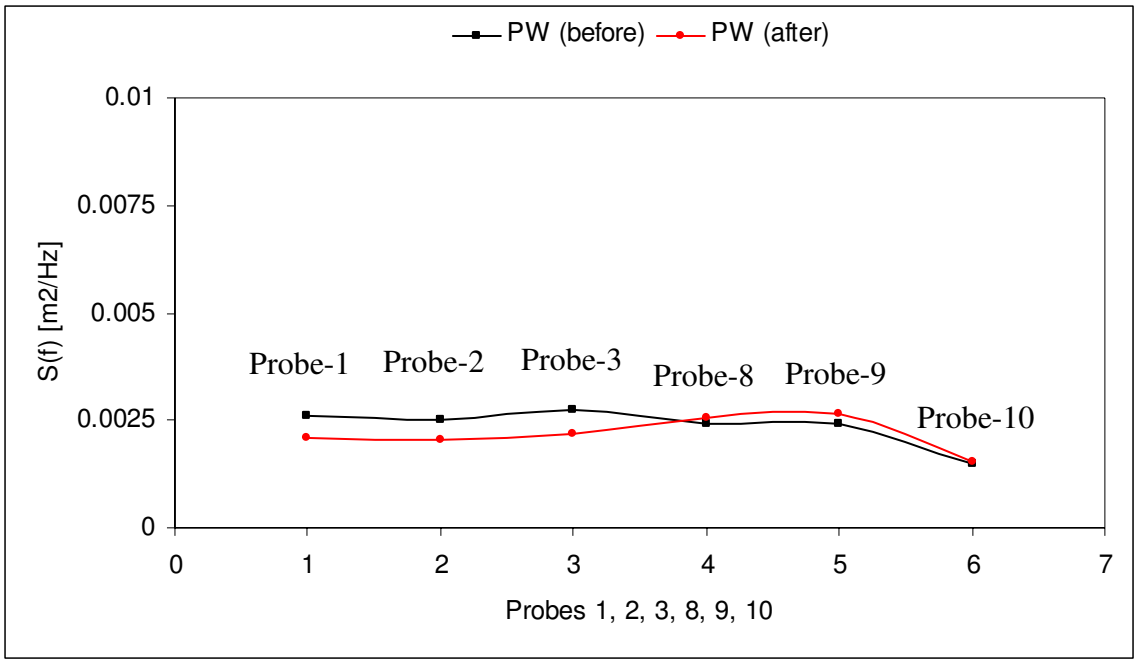

Fig. 34*g*: Along-tank energy distribution for isolated principal waves
M4-5: REGP4_H0P16_T4P105

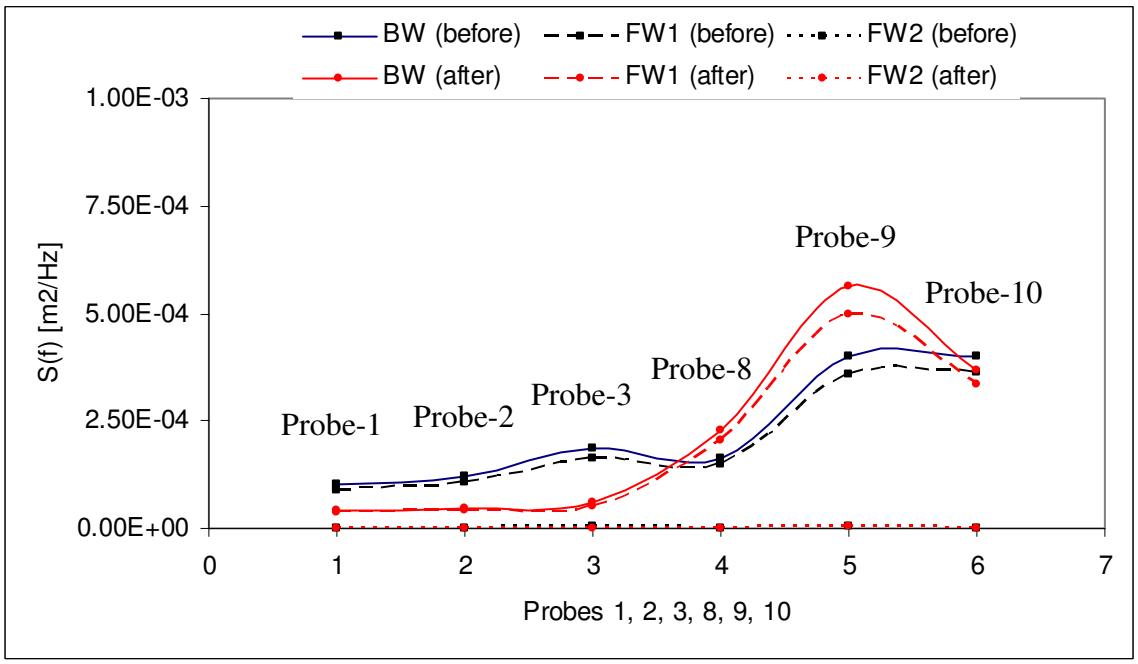

Fig. 34*h*: Along-tank energy distribution for isolated second-order waves
M4-5: REGP4_H0P16_T4P105

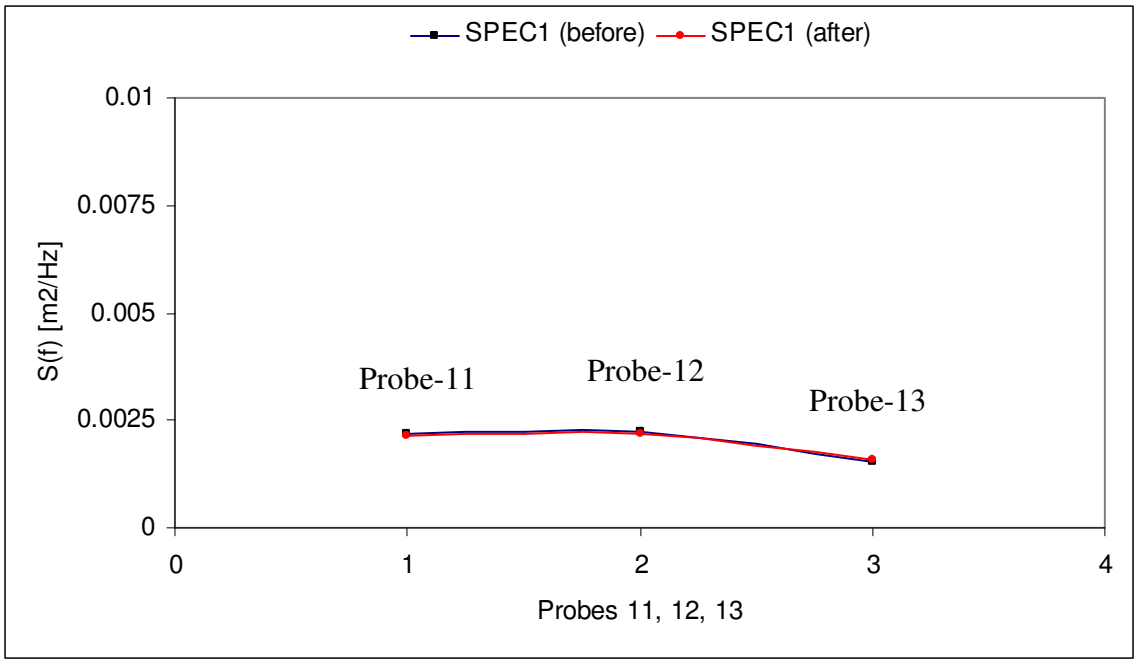

Fig. 34*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M4-5: REGP4_H0P16_T4P105

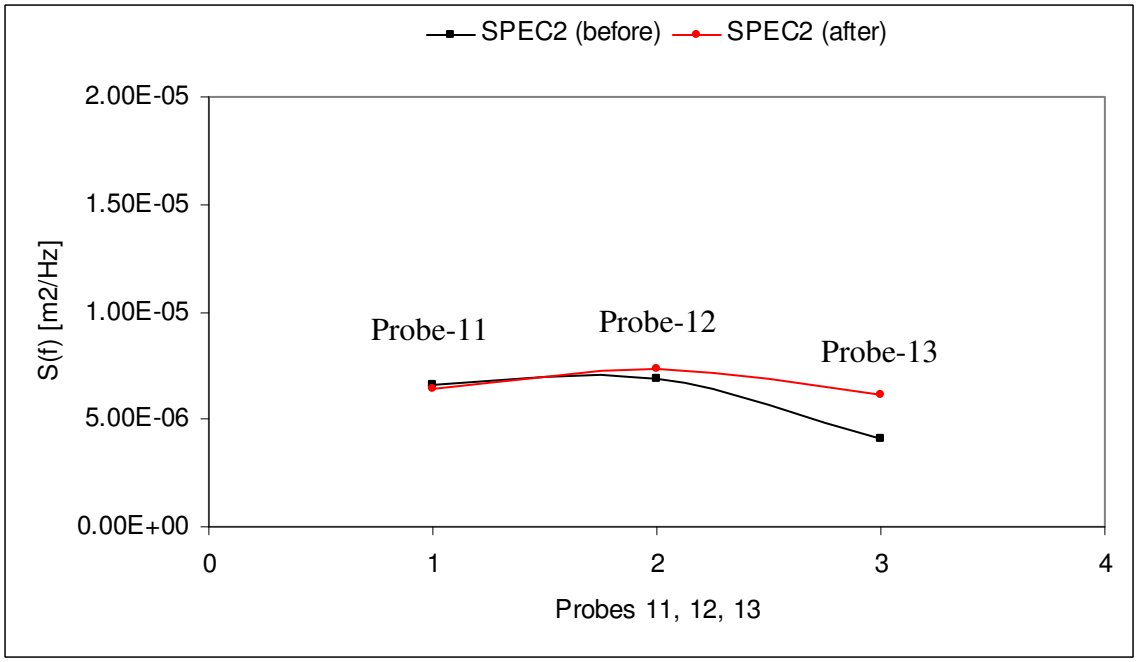

Fig. 34*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M4-5: REGP4_H0P16_T4P105

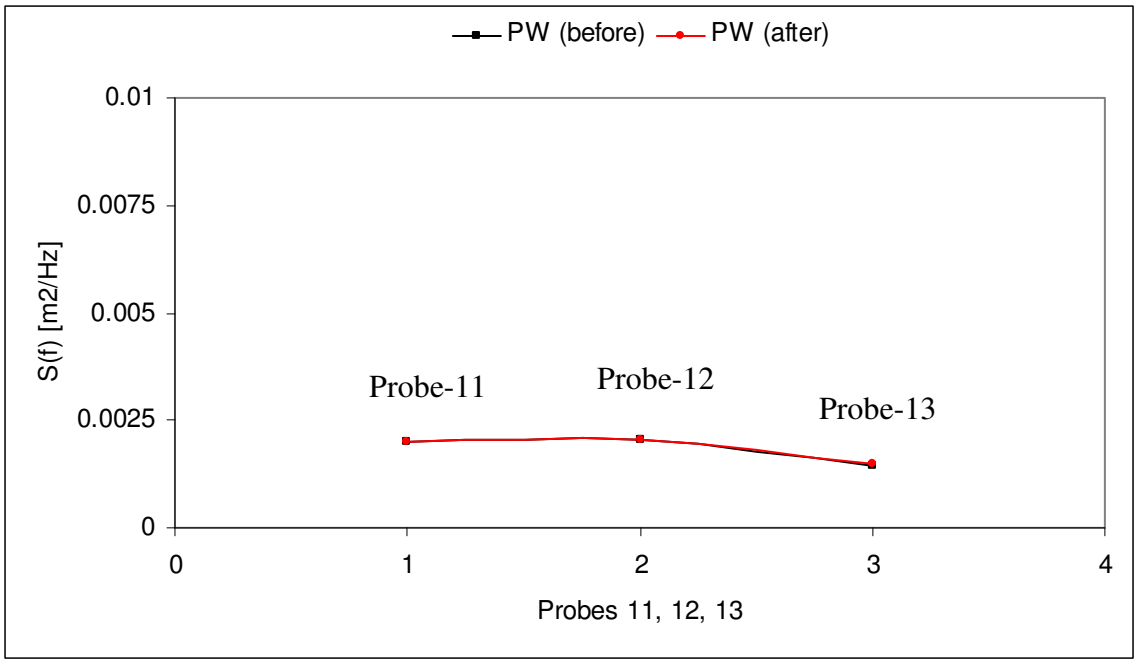

Fig. 34*k*: Cross-tank energy distribution for isolated principal waves
M4-5: REGP4_H0P16_T4P105

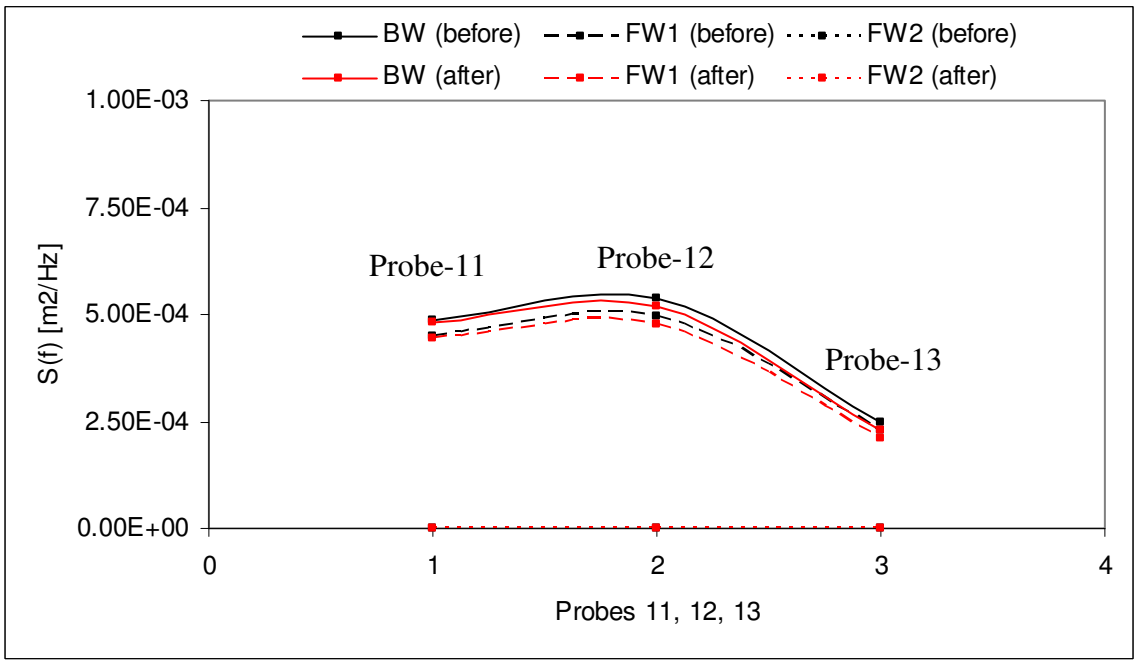

Fig. 34*l*: Cross-tank energy distribution for isolated second-order waves
M4-5: REGP4_H0P16_T4P105

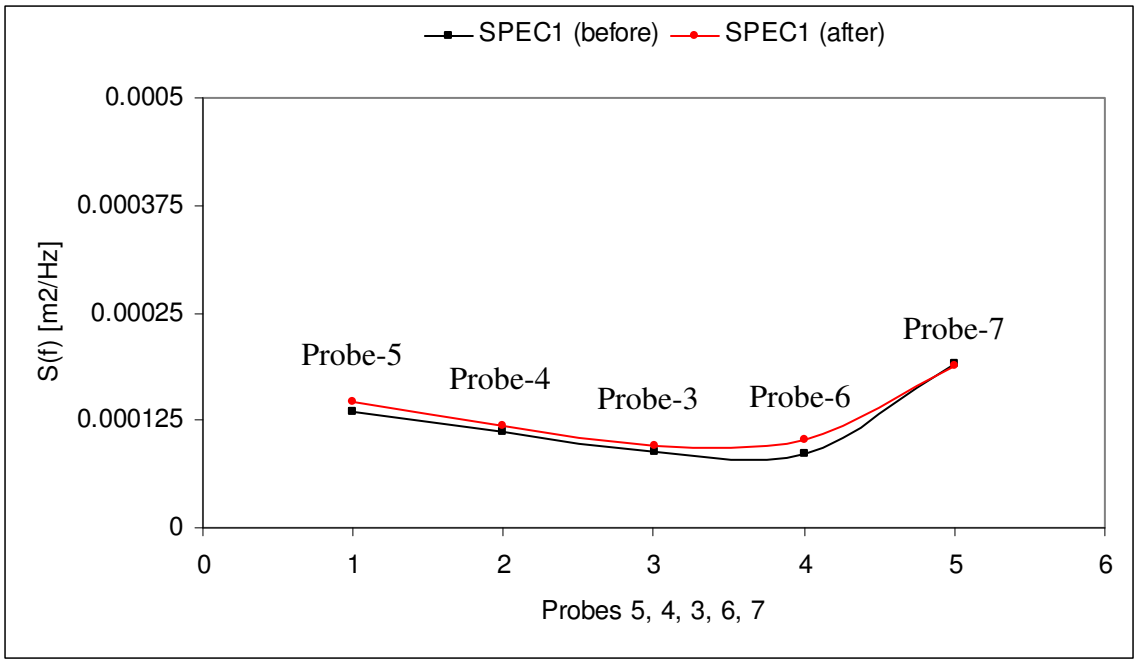

Fig. 35*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-1: REGP5_H0P04_T1P977

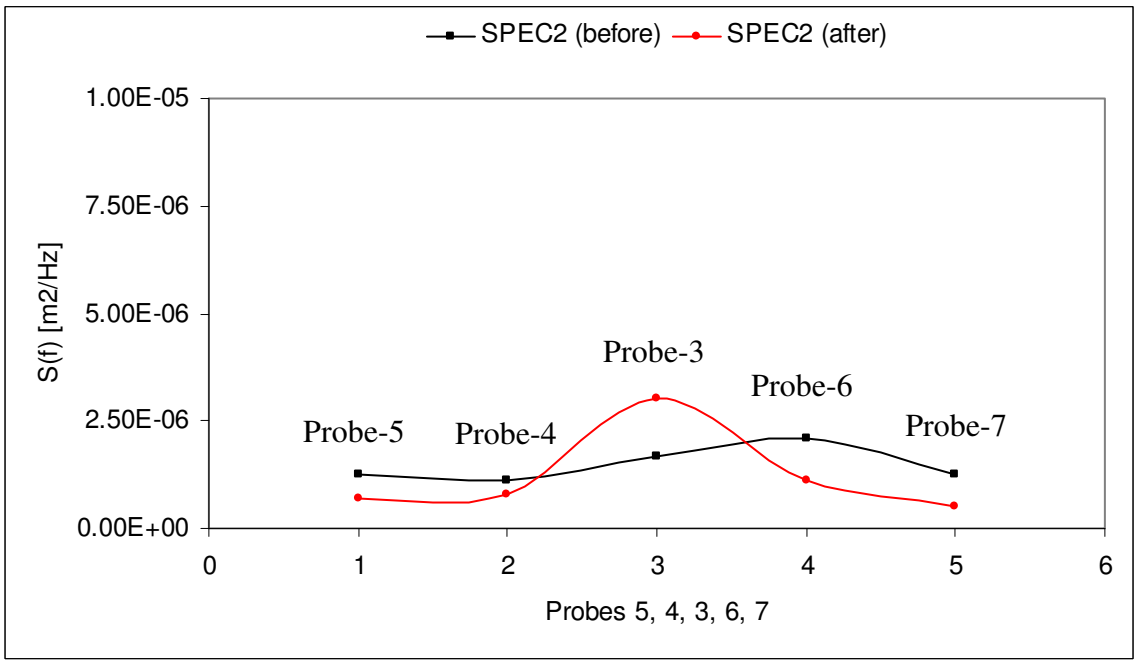

Fig. 35*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-1: REGP5_H0P04_T1P977

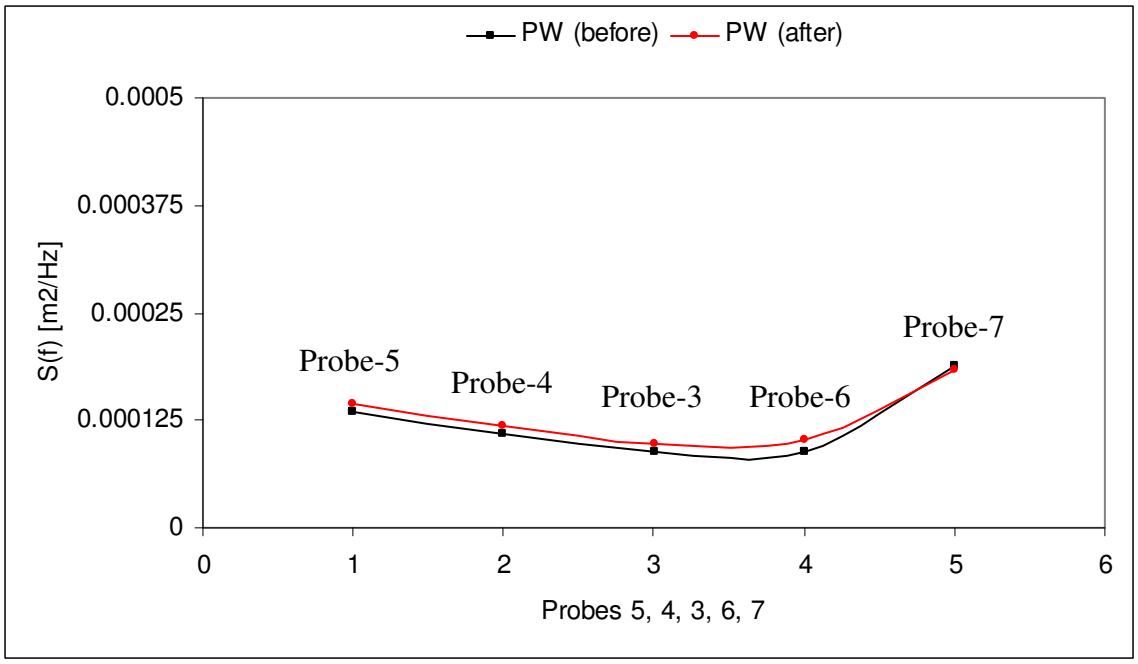

Fig. 35*c*: Cross-tank energy distribution for isolated principal waves
M5-1: REGP5_H0P04_T1P977

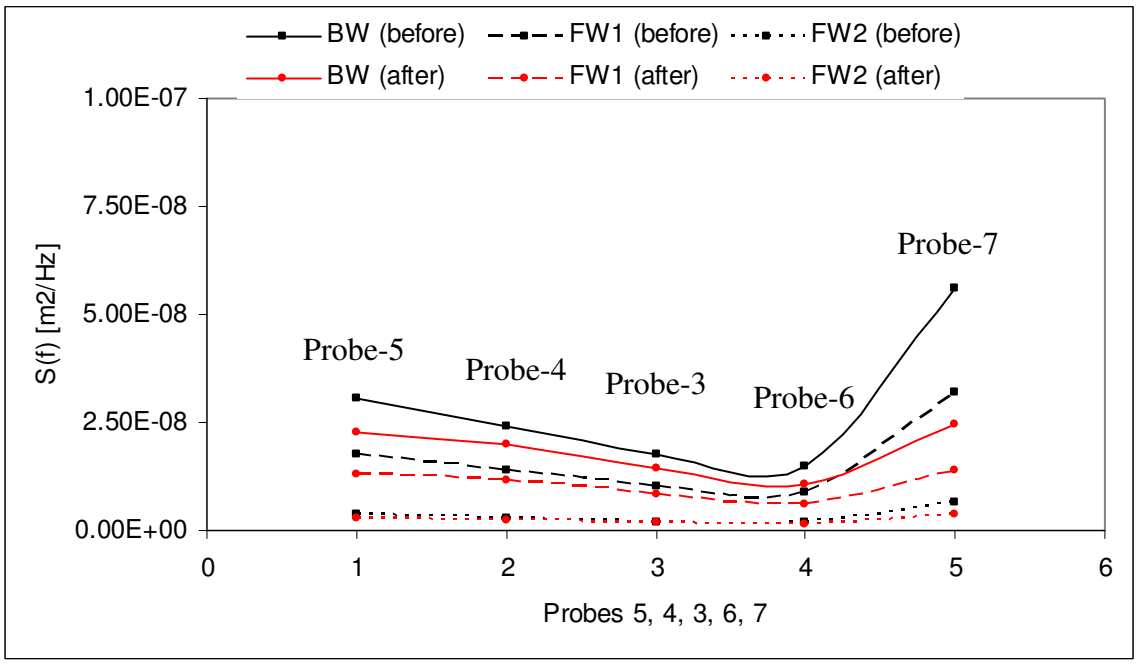

Fig. 35*d*: Cross-tank energy distribution for isolated second-order waves
M5-1: REGP5_H0P04_T1P977

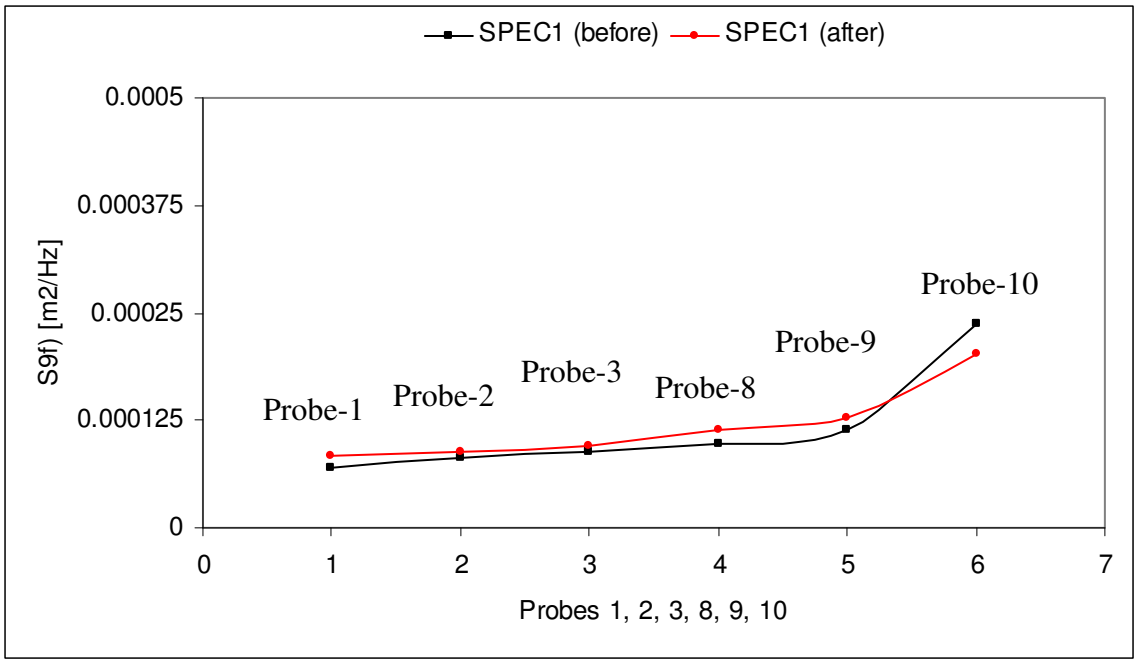

Fig. 35*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-1: REGP5_H0P04_T1P977

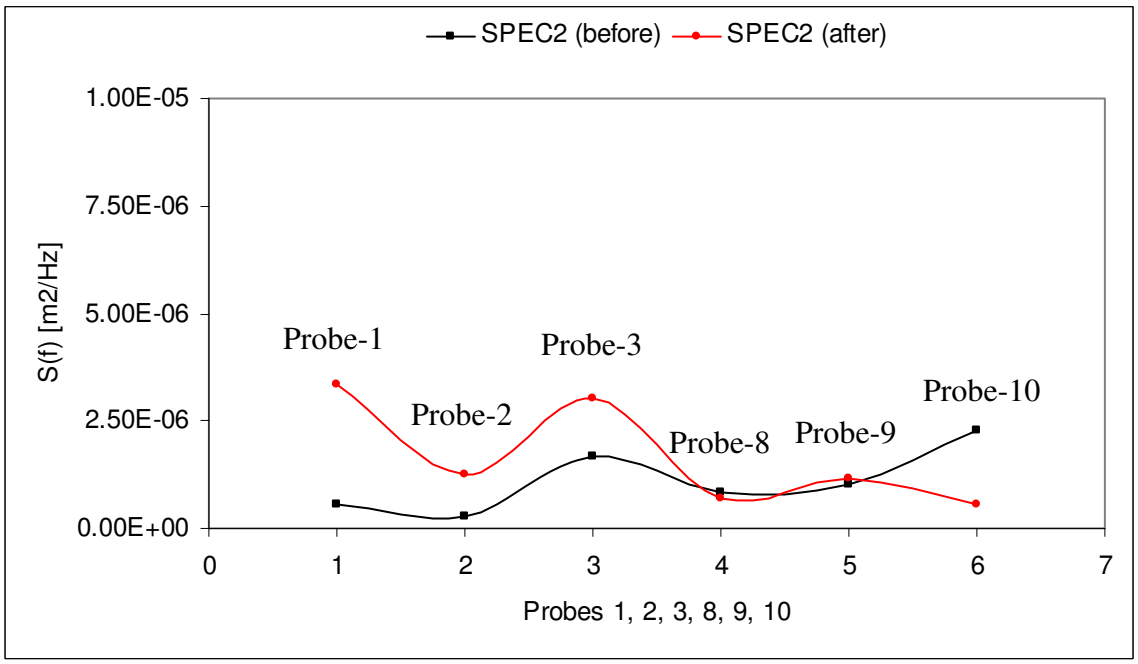

Fig. 35*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-1: REGP5_H0P04_T1P977

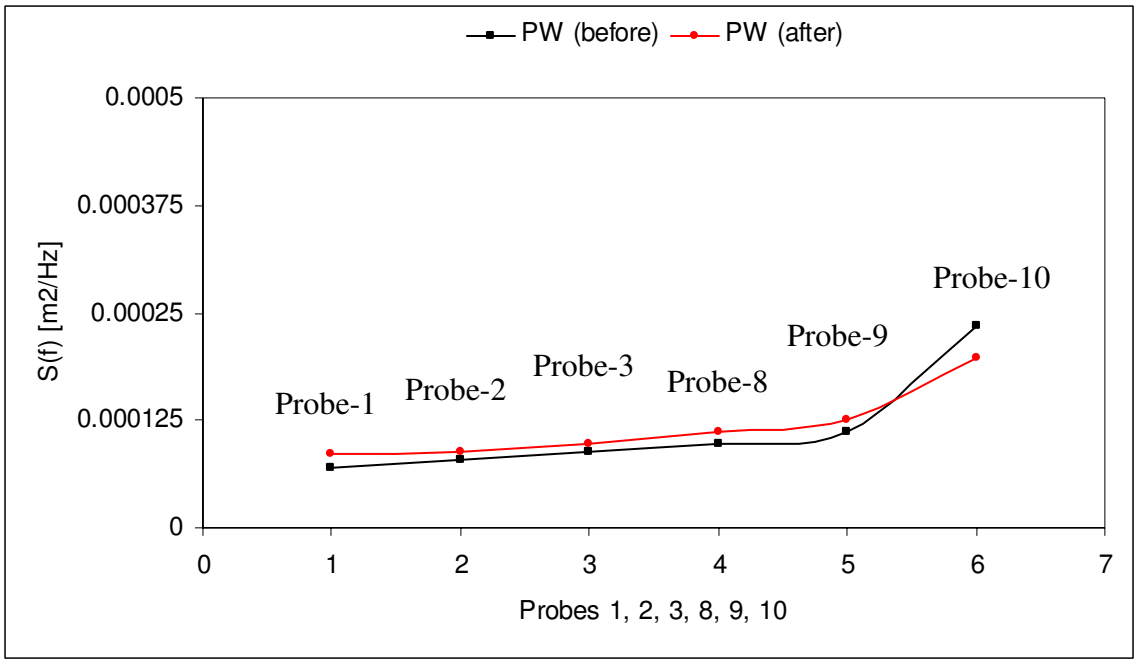

Fig. 35*g*: Along-tank energy distribution for isolated principal waves
M5-1: REGP5_H0P04_T1P977

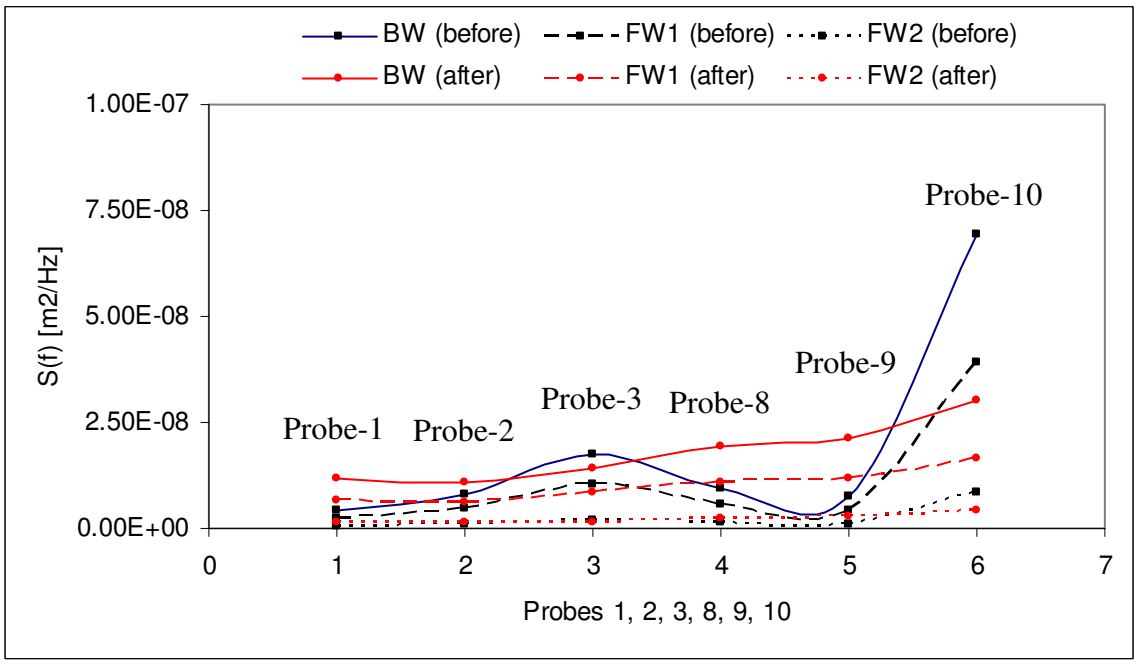

Fig. 35*h*: Along-tank energy distribution for isolated second-order waves
M5-1: REGP5_H0P04_T1P977

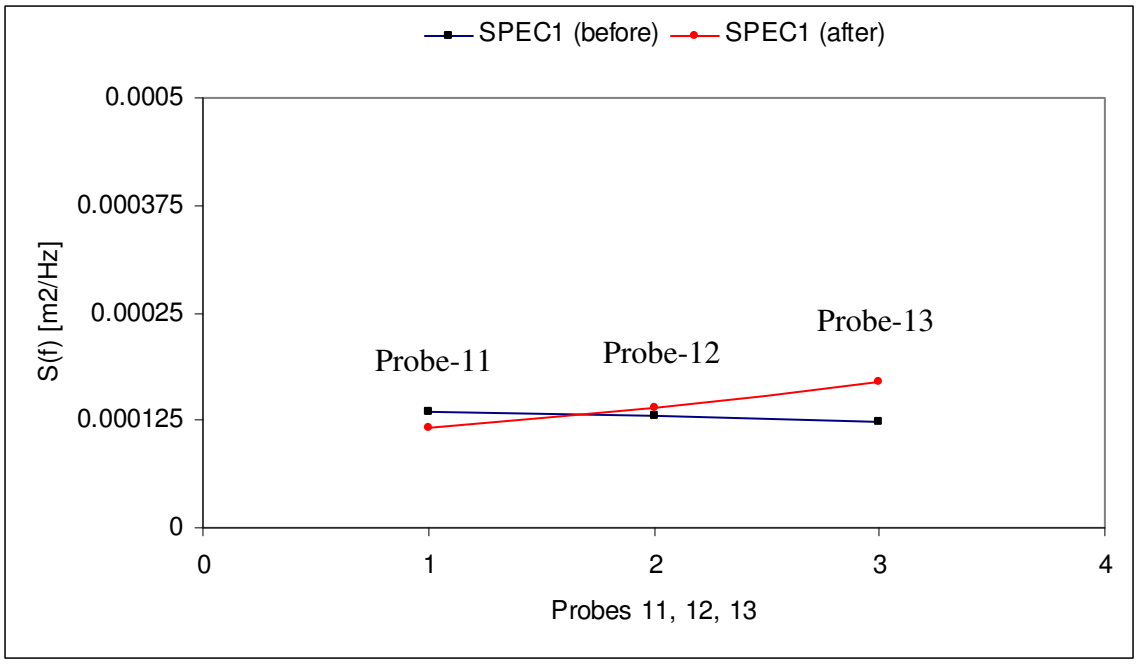

Fig. 35*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-1: REGP5_H0P04_T1P977

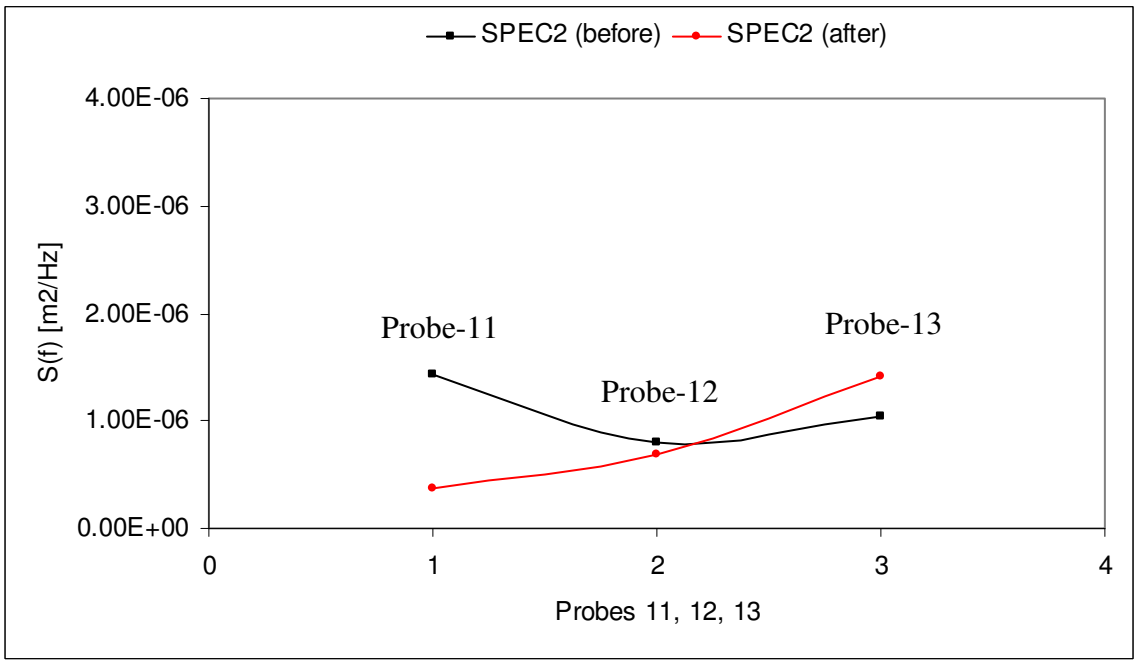

Fig. 35*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-1: REGP5_H0P04_T1P977

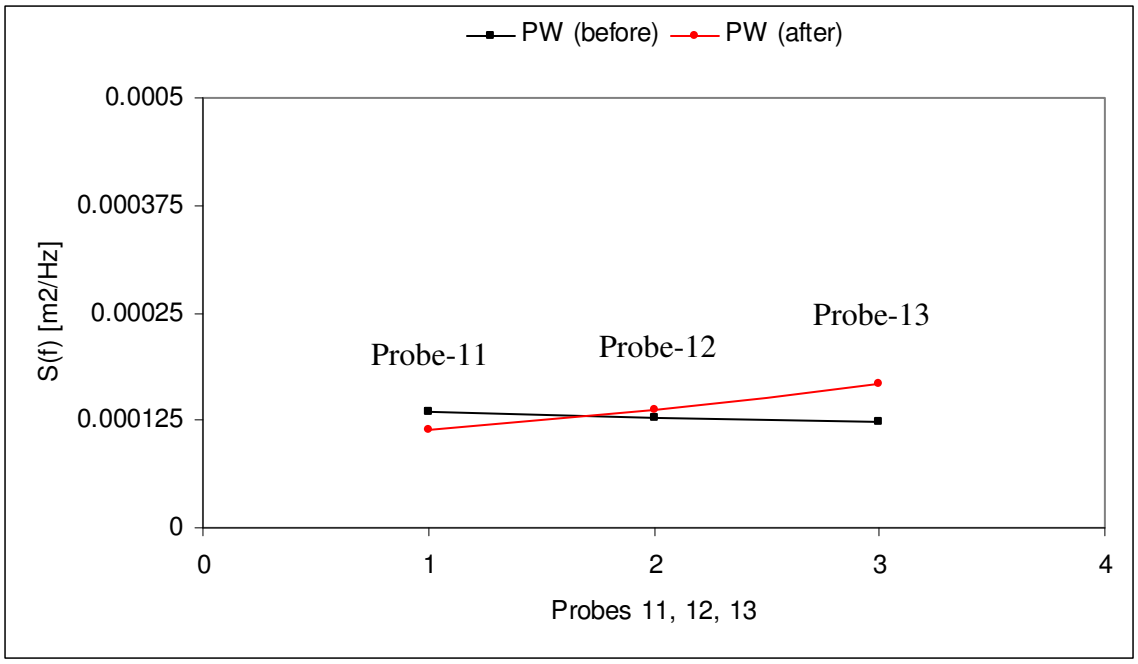

Fig. 35*k*: Cross-tank energy distribution for isolated principal waves
M5-1: REGP5_H0P04_T1P977

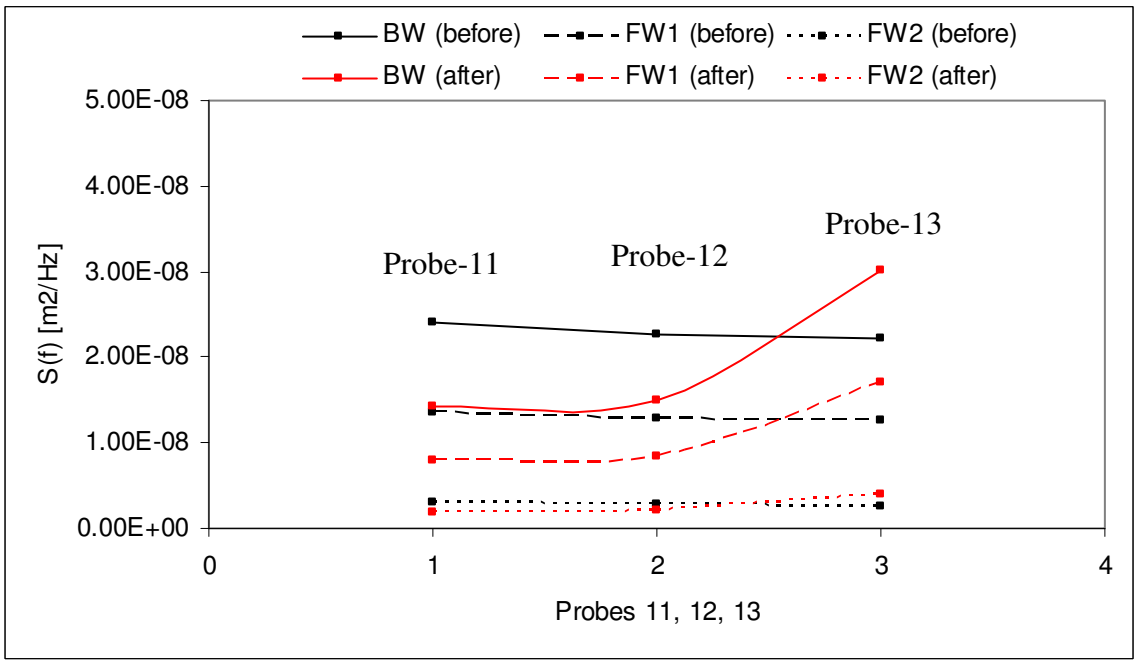

Fig. 35*l*: Cross-tank energy distribution for isolated second-order waves
M5-1: REGP5_H0P04_T1P977

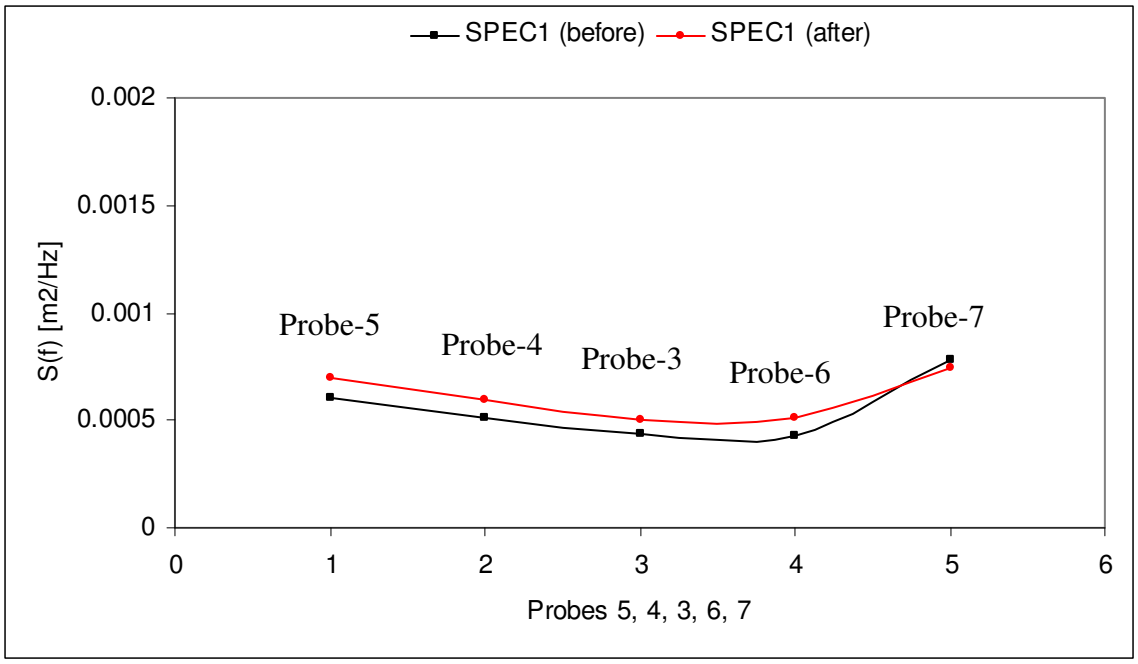

Fig. 36*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-2: REGP5_H0P08_T1P977

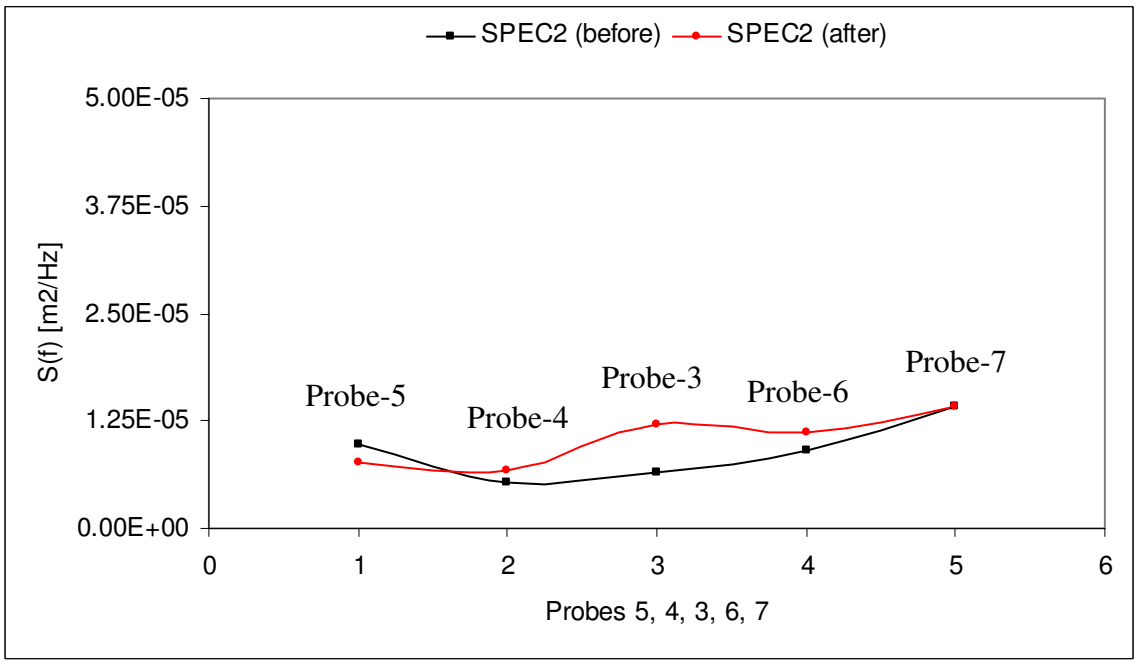

Fig. 36*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-2: REGP5_H0P08_T1P977

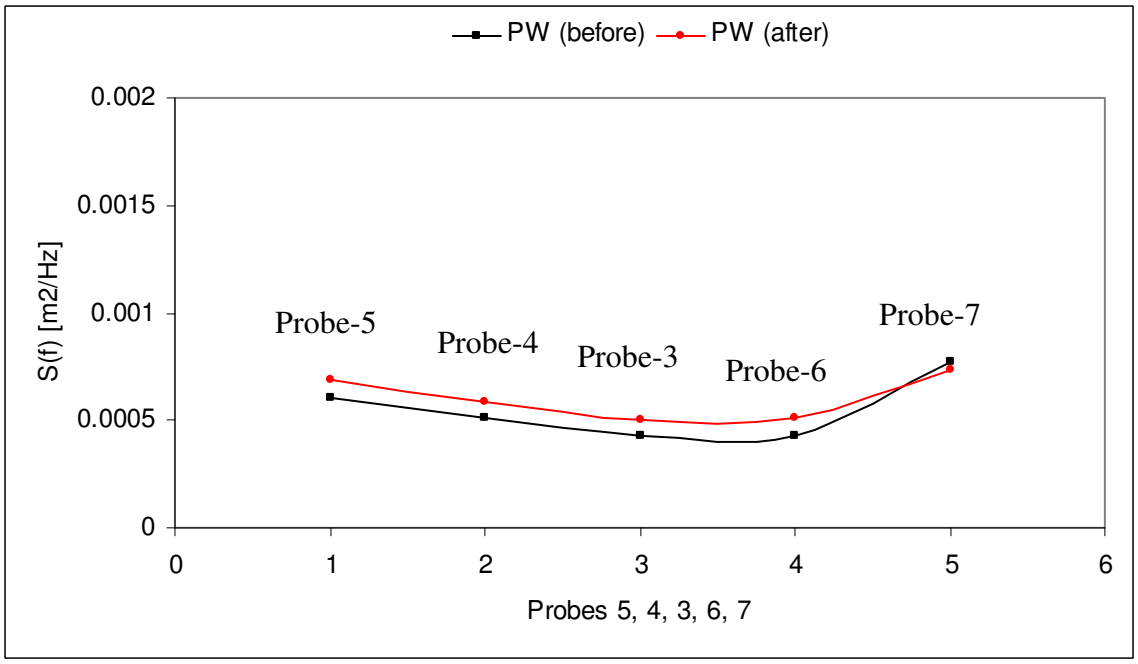

Fig. 36*c*: Cross-tank energy distribution for isolated principal waves
M5-2: REGP5_H0P08_T1P977

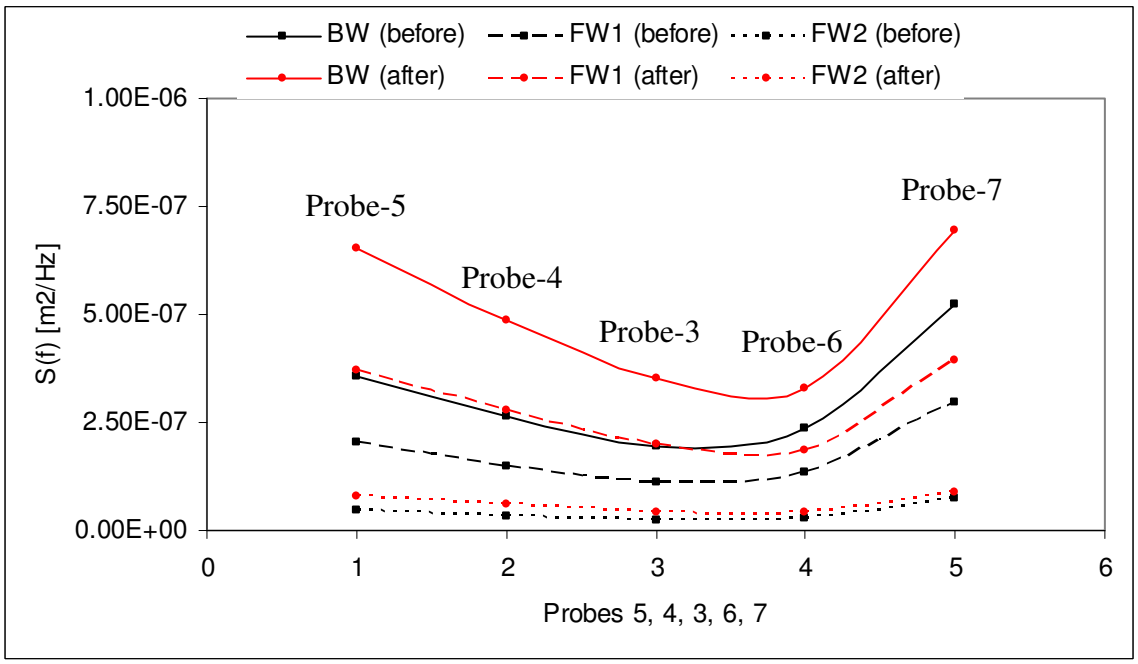

Fig. 36*d*: Cross-tank energy distribution for isolated second-order waves
M5-2: REGP5_H0P08_T1P977

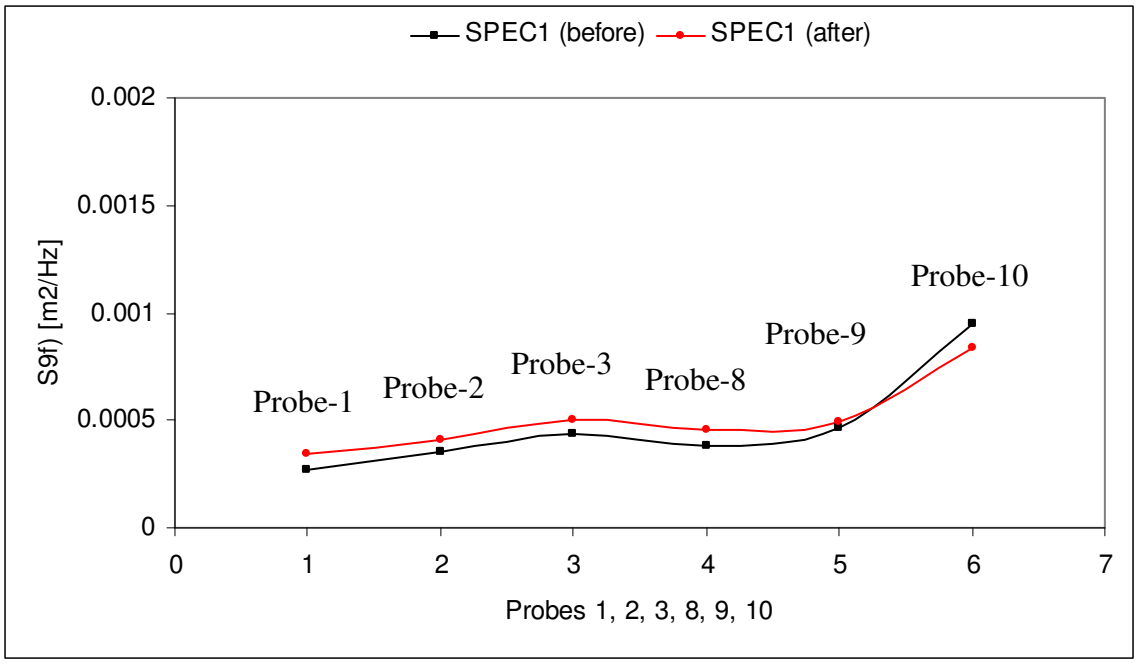

Fig. 36*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-2: REGP5_H0P08_T1P977

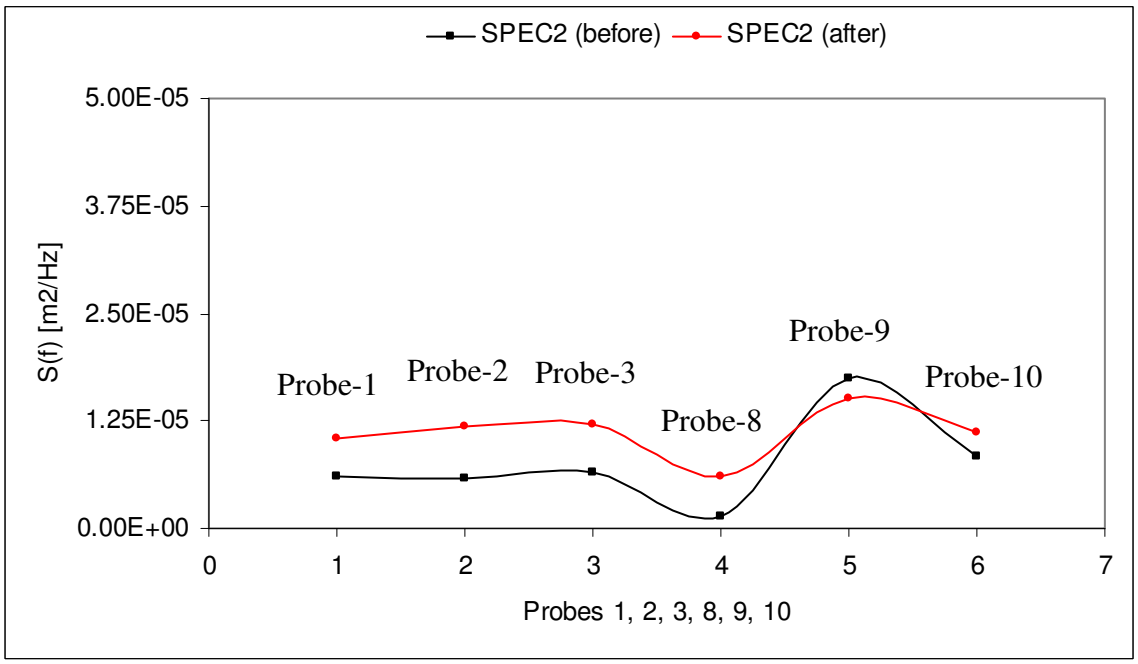

Fig. 36*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-2: REGP5_H0P08_T1P977

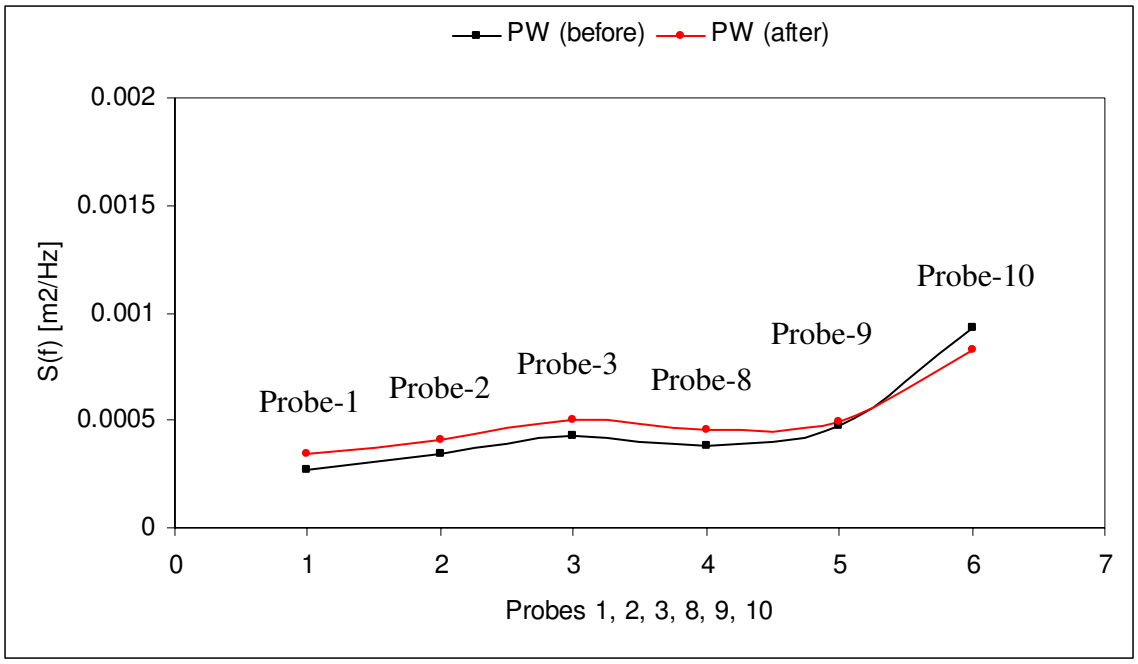

Fig. 36*g*: Along-tank energy distribution for isolated principal waves
M5-2: REGP5_H0P08_T1P977

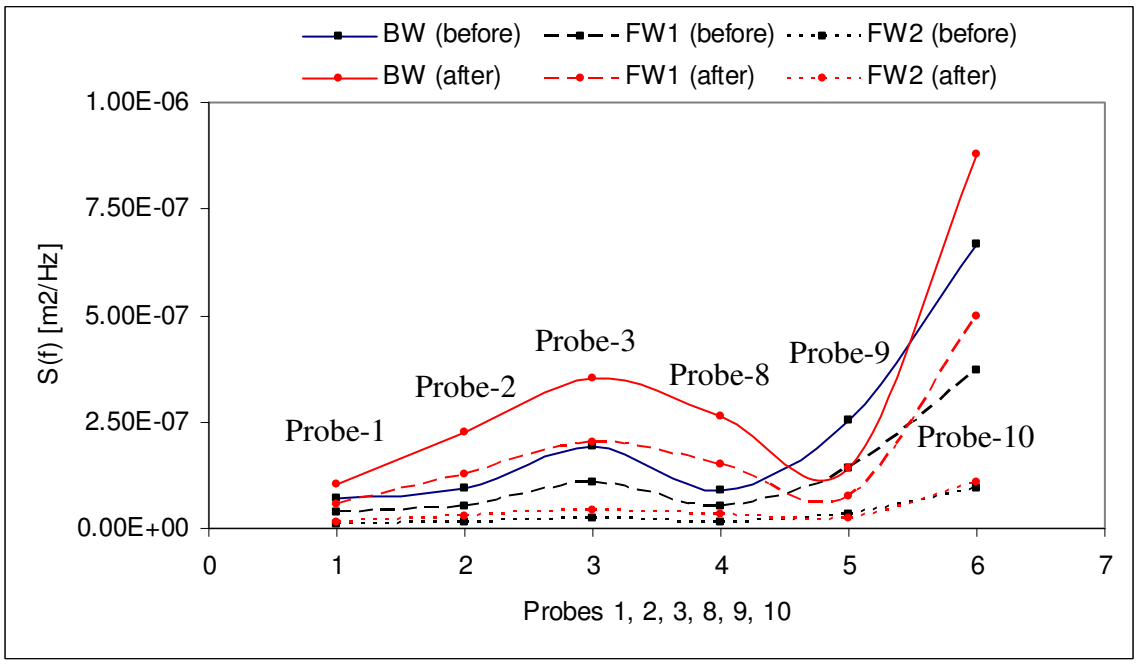

Fig. 36*h*: Along-tank energy distribution for isolated second-order waves
M5-2: REGP5_H0P08_T1P977

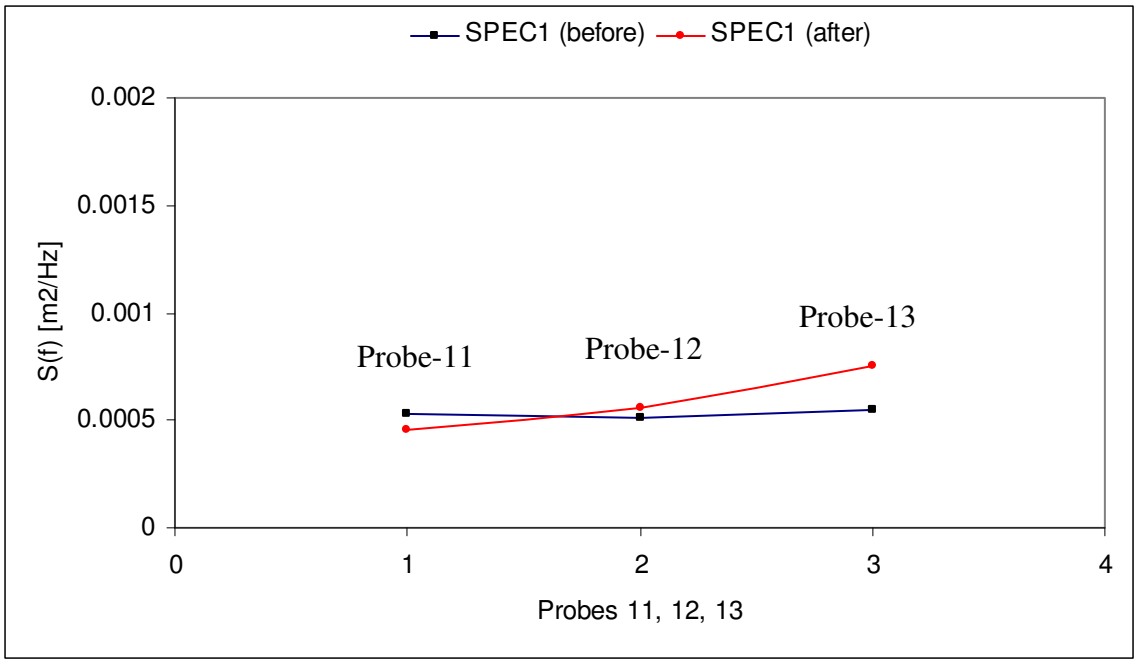

Fig. 36*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-2: REGP5_H0P08_T1P977

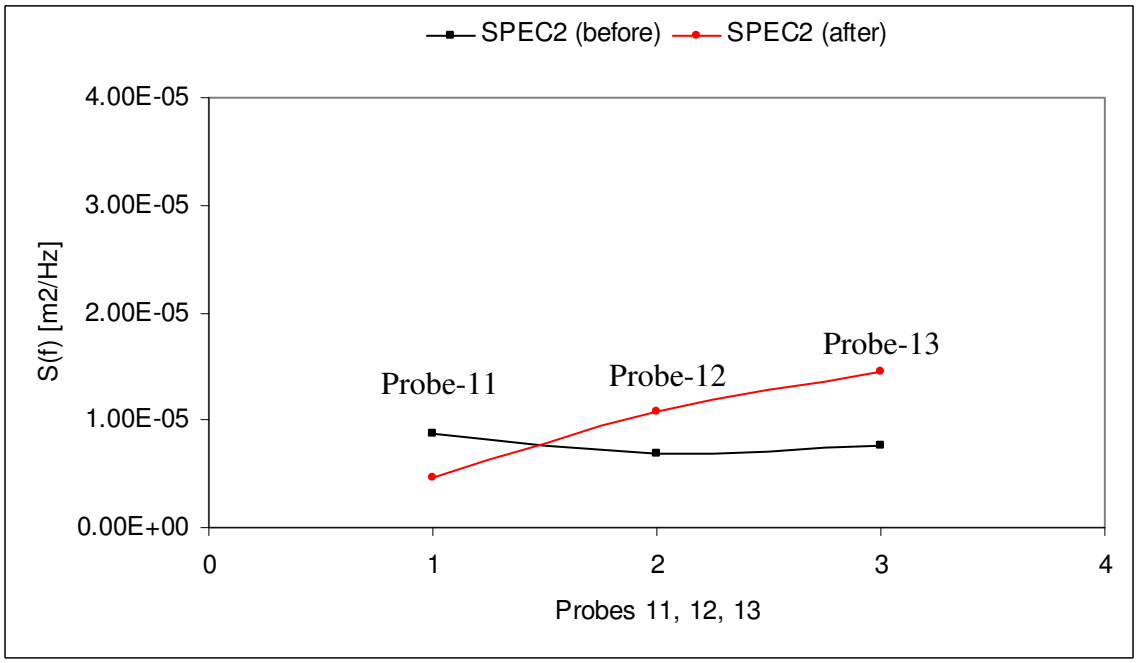

Fig. 36*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-2: REGP5_H0P08_T1P977

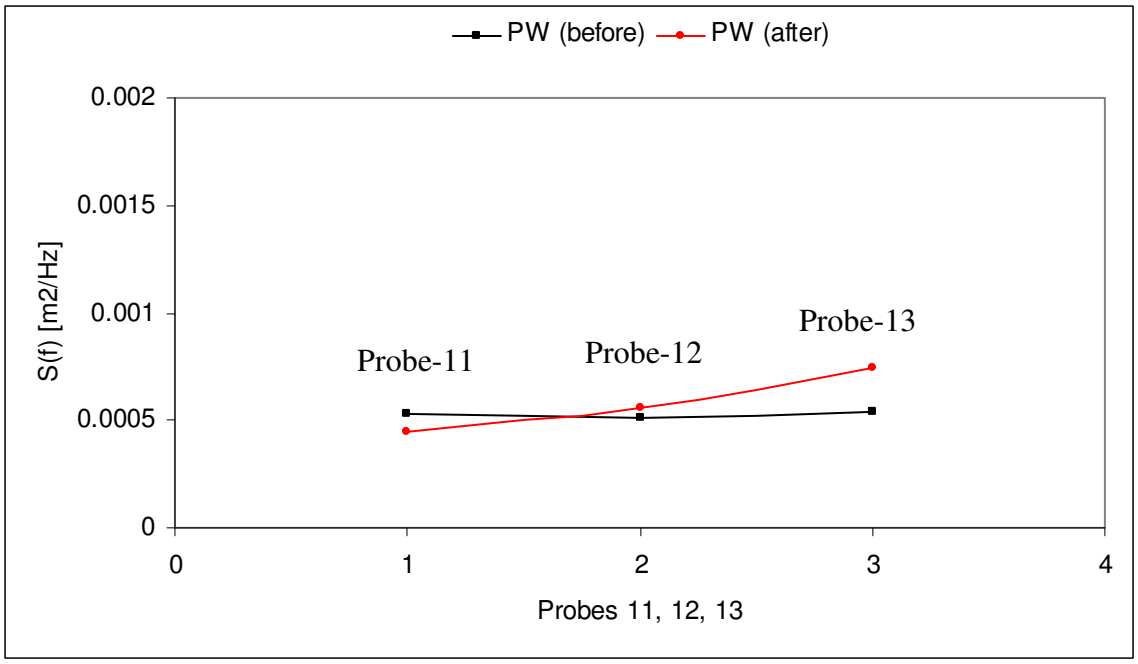

Fig. 36*k*: Cross-tank energy distribution for isolated principal waves
M5-2: REGP5_H0P08_T1P977

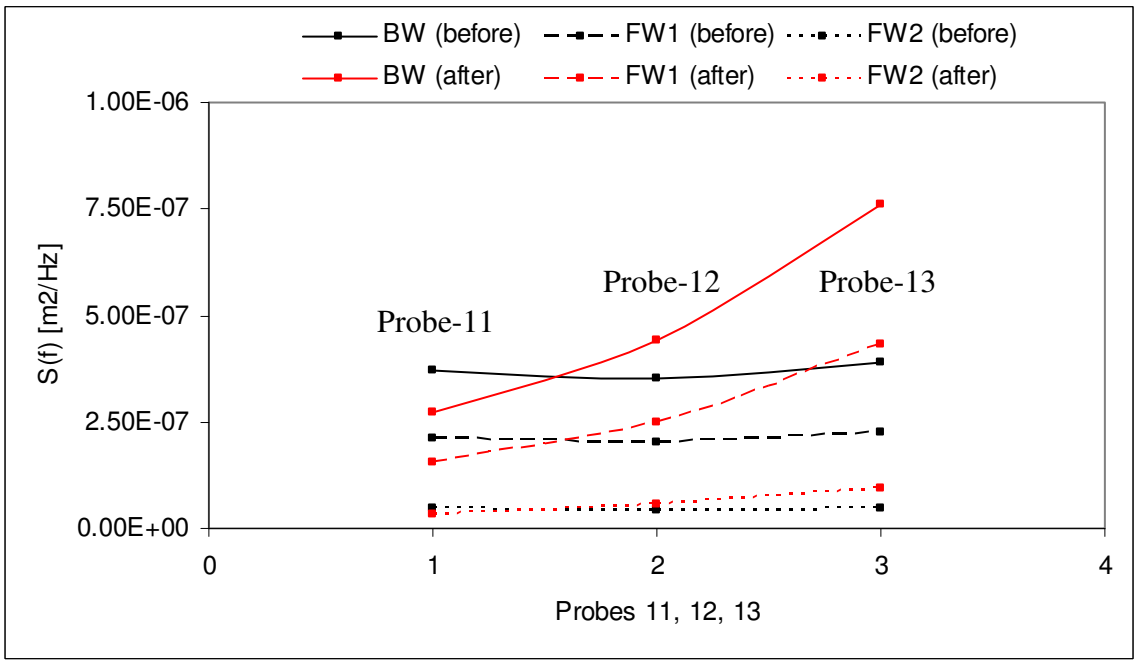

Fig. 36*l*: Cross-tank energy distribution for isolated second-order waves
M5-2: REGP5_H0P08_T1P977

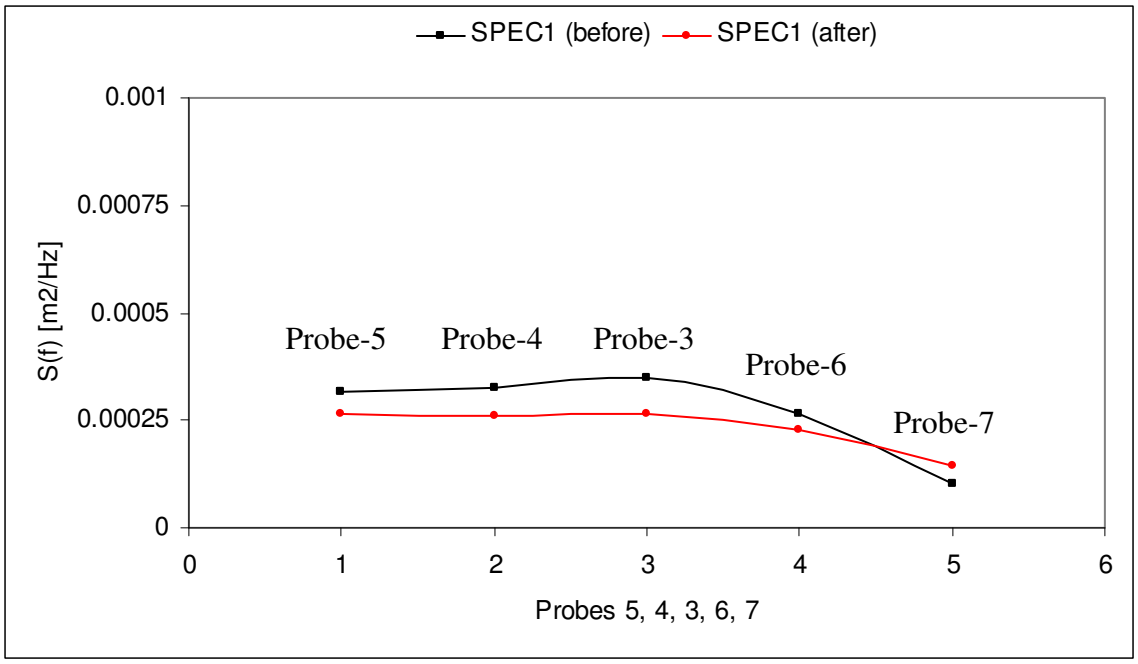

Fig. 37*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-3: REGP5_H0P06_T2P829

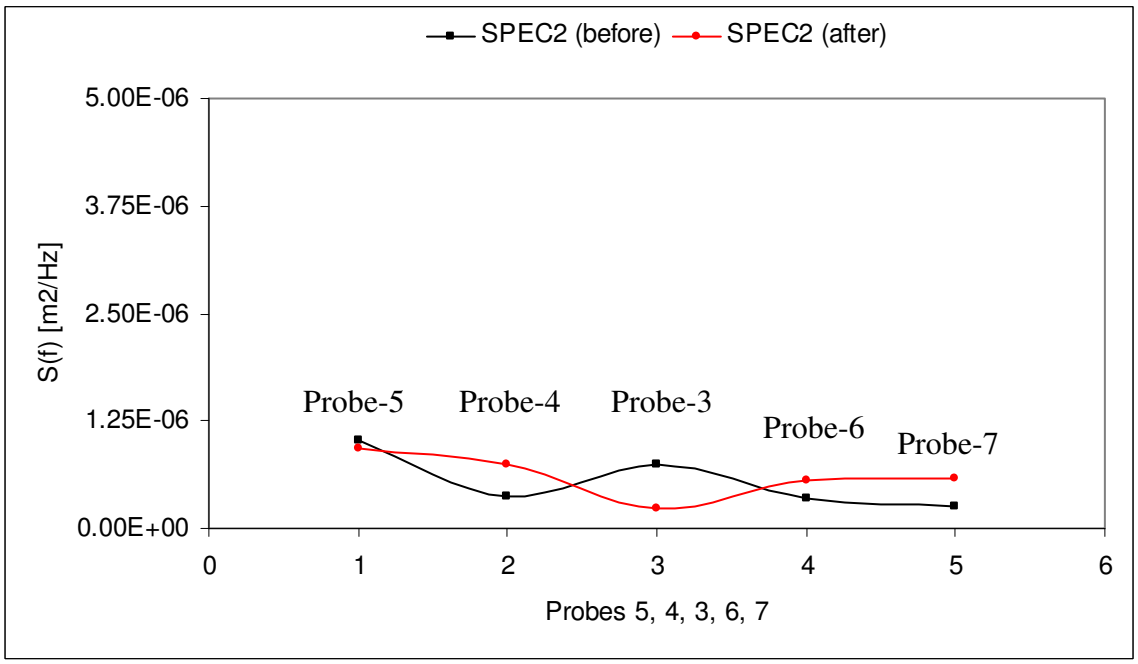

Fig. 37*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-3: REGP5_H0P06_T2P829

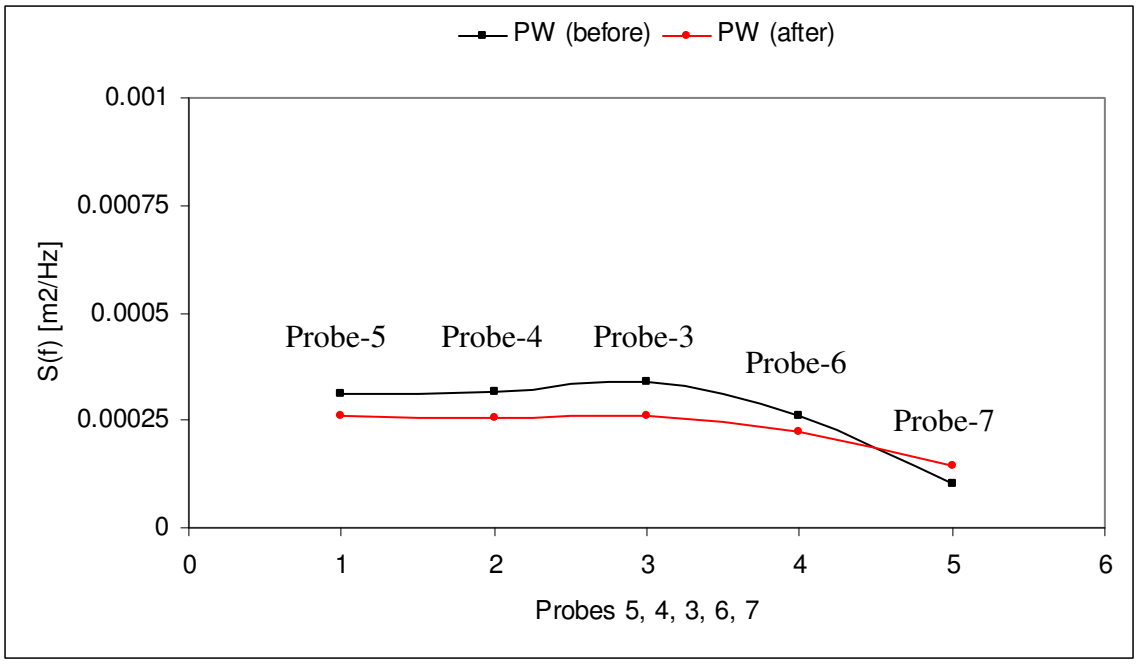

Fig. 37*c*: Cross-tank energy distribution for isolated principal waves
M5-3: REGP5_H0P06_T2P829

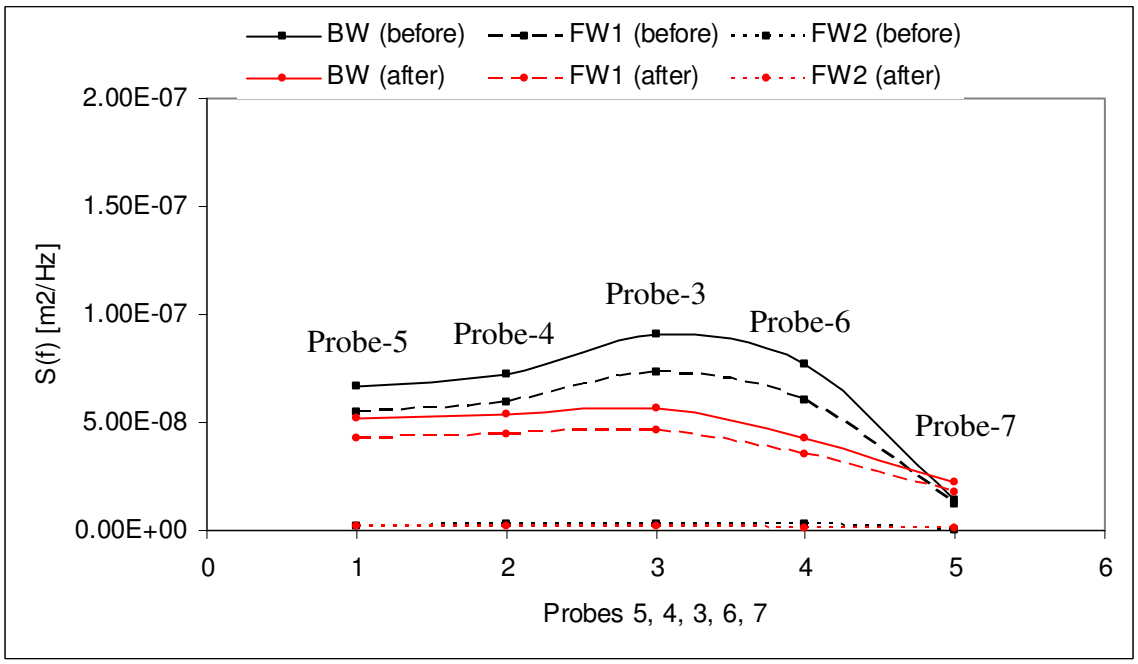

Fig. 37*d*: Cross-tank energy distribution for isolated second-order waves
M5-3: REGP5_H0P06_T2P829

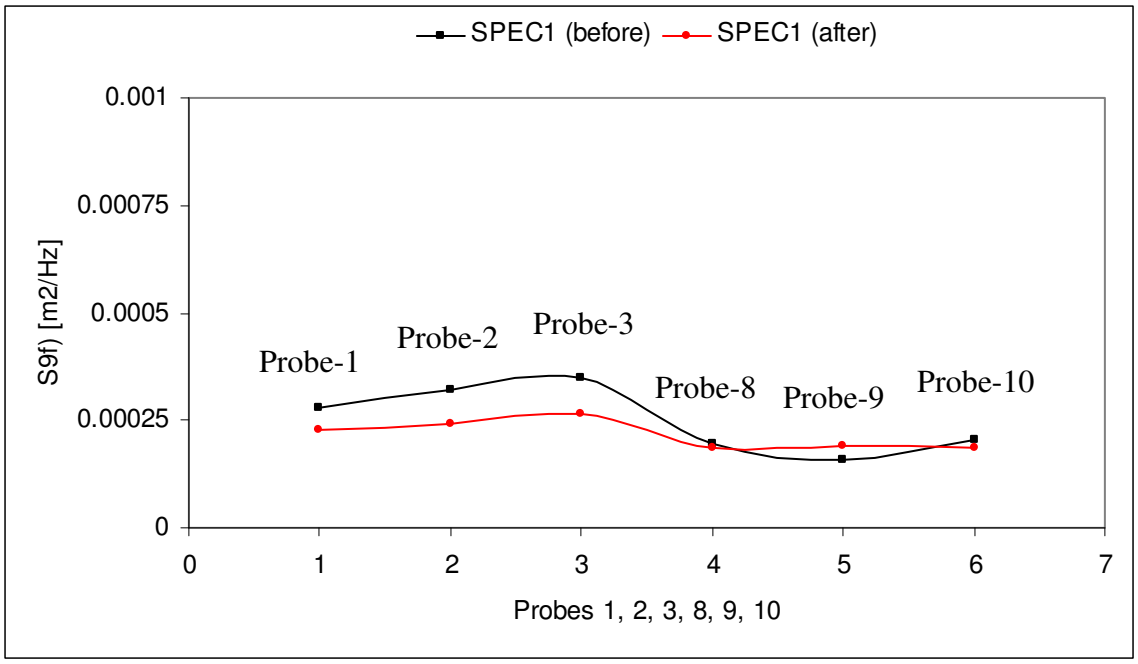

Fig. 37*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-3: REGP5_H0P06_T2P829

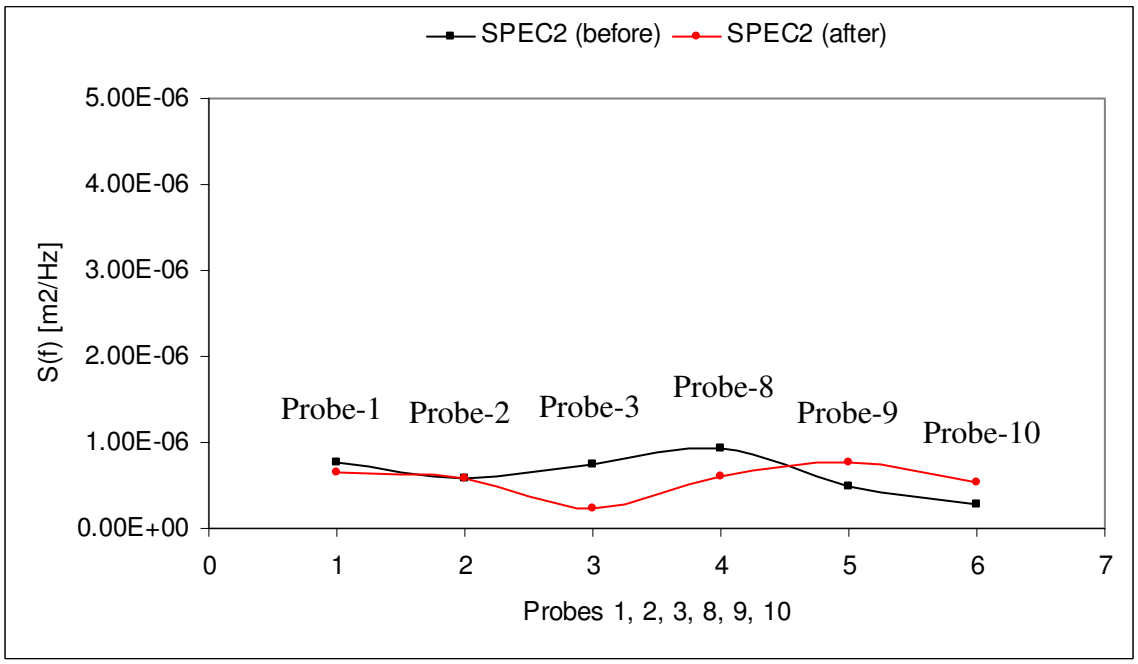

Fig. 37*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-3: REGP5_H0P06_T2P829

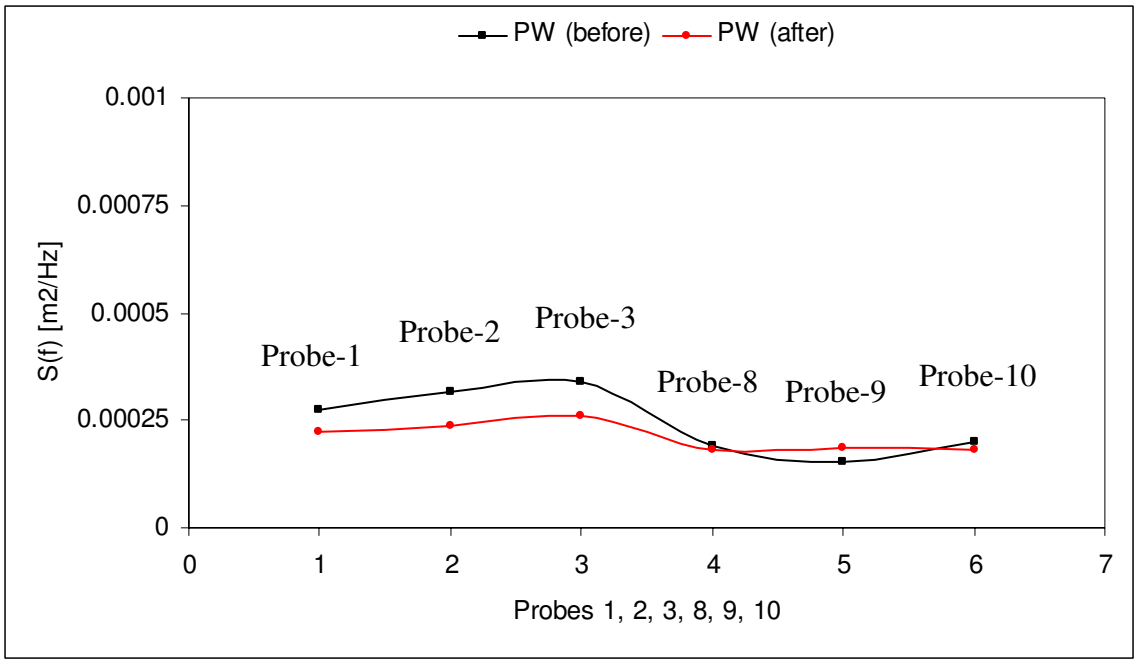

Fig. 37*g*: Along-tank energy distribution for isolated principal waves
M5-3: REGP5_H0P06_T2P829

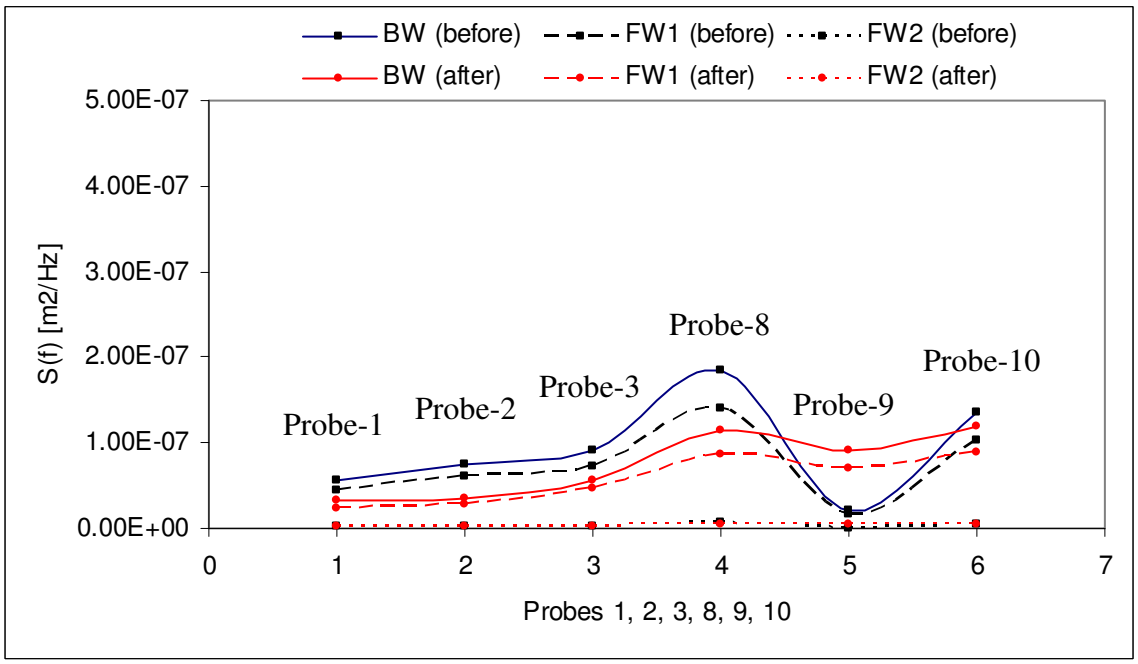

Fig. 37*h*: Along-tank energy distribution for isolated second-order waves
M5-3: REGP5_H0P06_T2P829

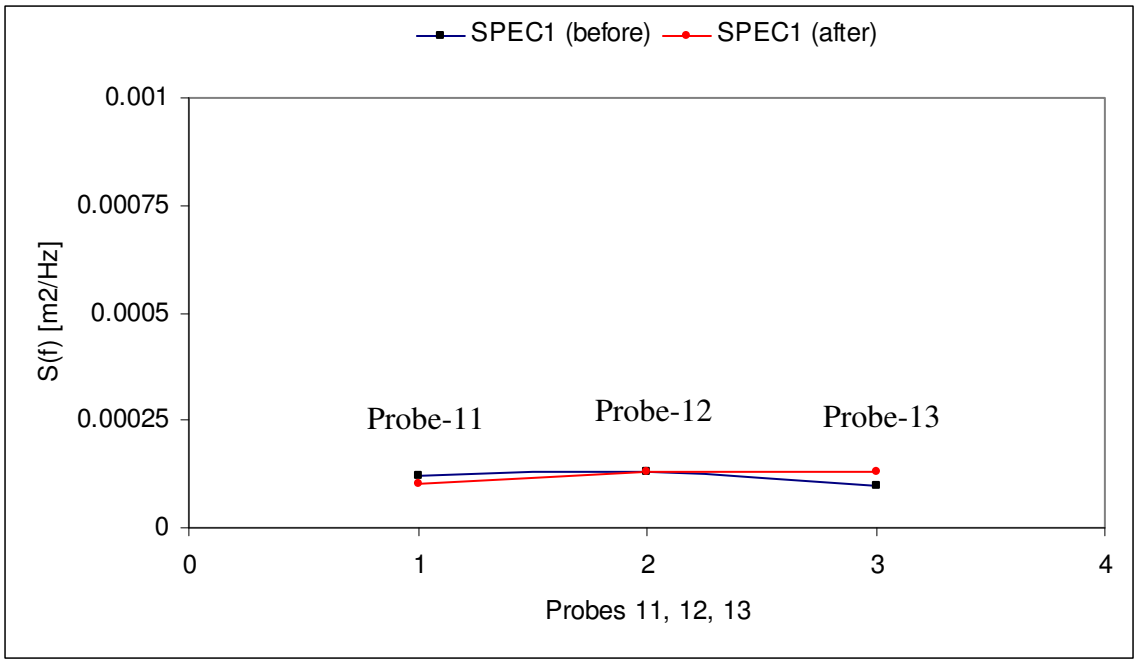

Fig. 37*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-3: REGP5_H0P06_T2P829

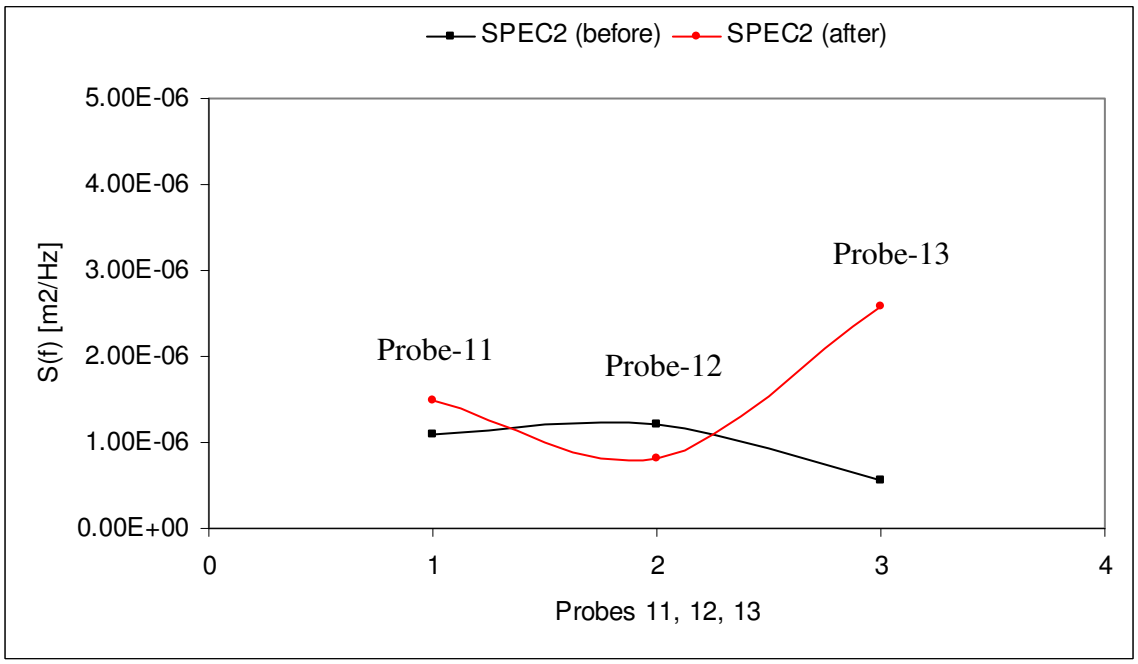

Fig. 37*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-3: REGP5_H0P06_T2P829

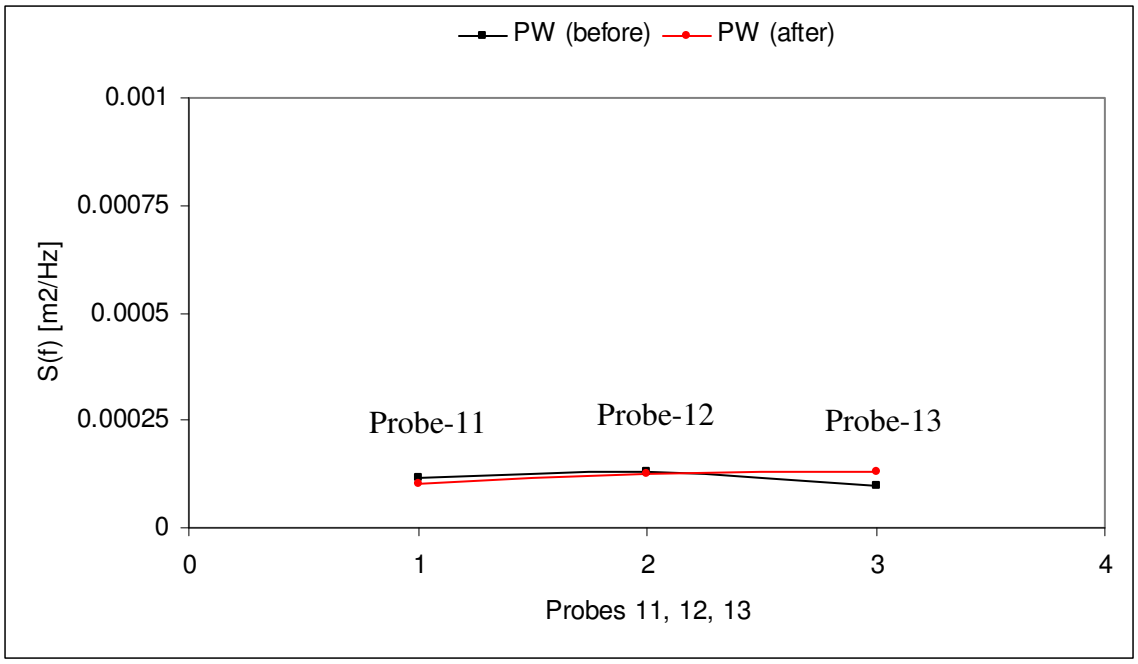

Fig. 37*k*: Cross-tank energy distribution for isolated principal waves
M5-3: REGP5_H0P06_T2P829

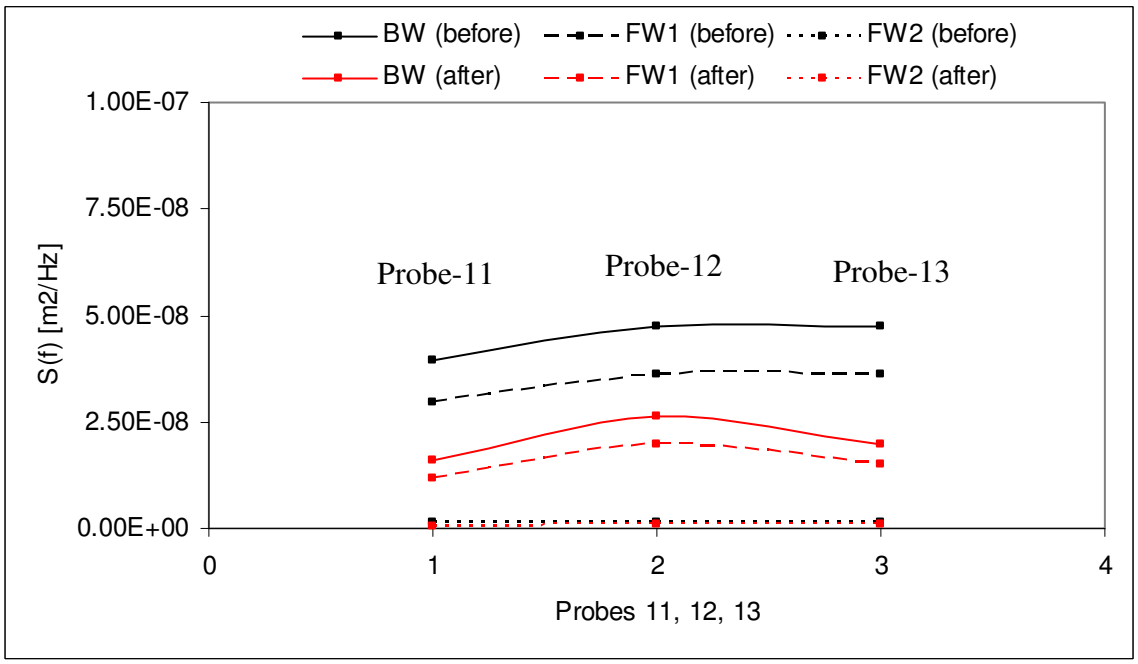

Fig. 37*l*: Cross-tank energy distribution for isolated second-order waves
M5-3: REGP5_H0P06_T2P829

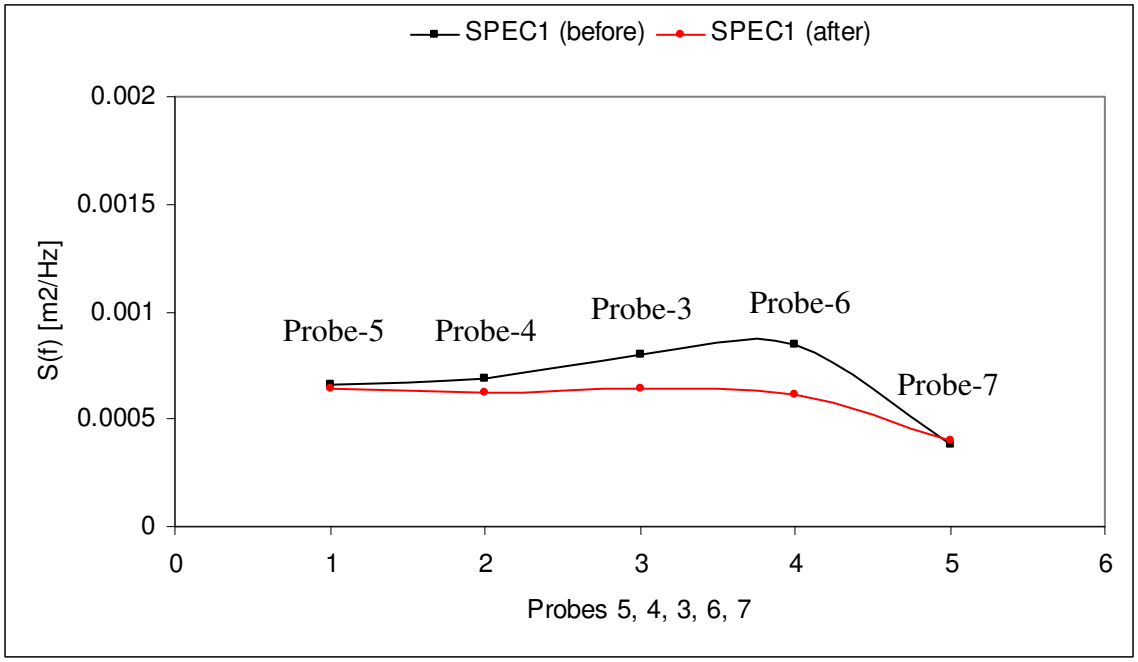

Fig. 38*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-4: REGP5_H0P08_T3P704

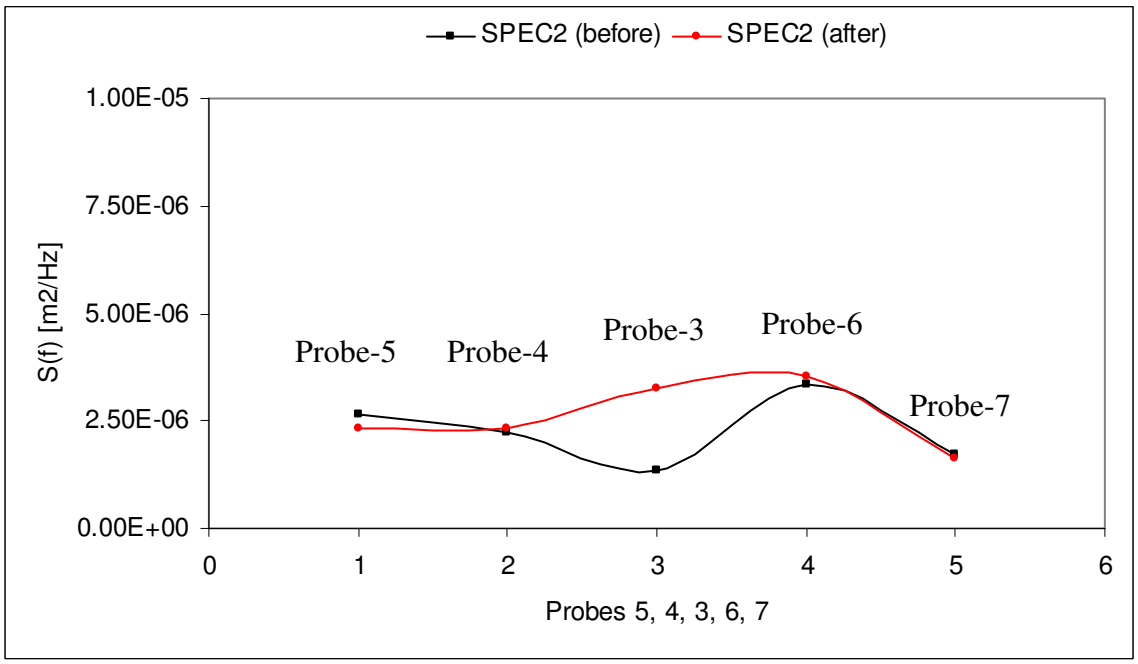

Fig. 38*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-4: REGP5_H0P08_T3P704

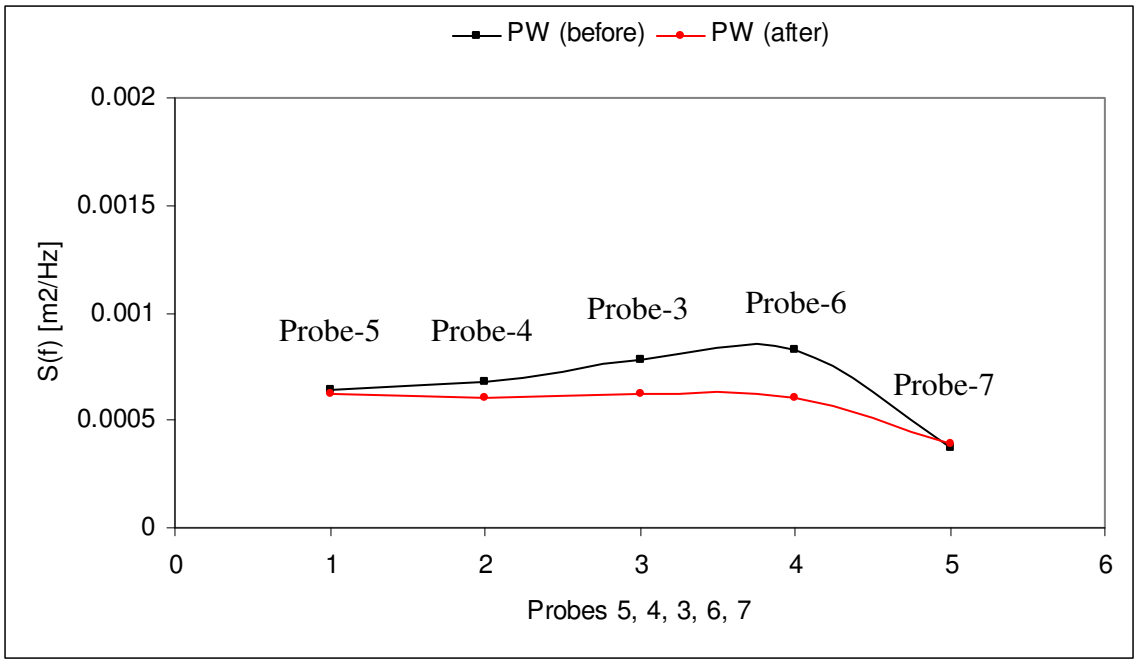

Fig. 38*c*: Cross-tank energy distribution for isolated principal waves
M5-4: REGP5_H0P08_T3P704

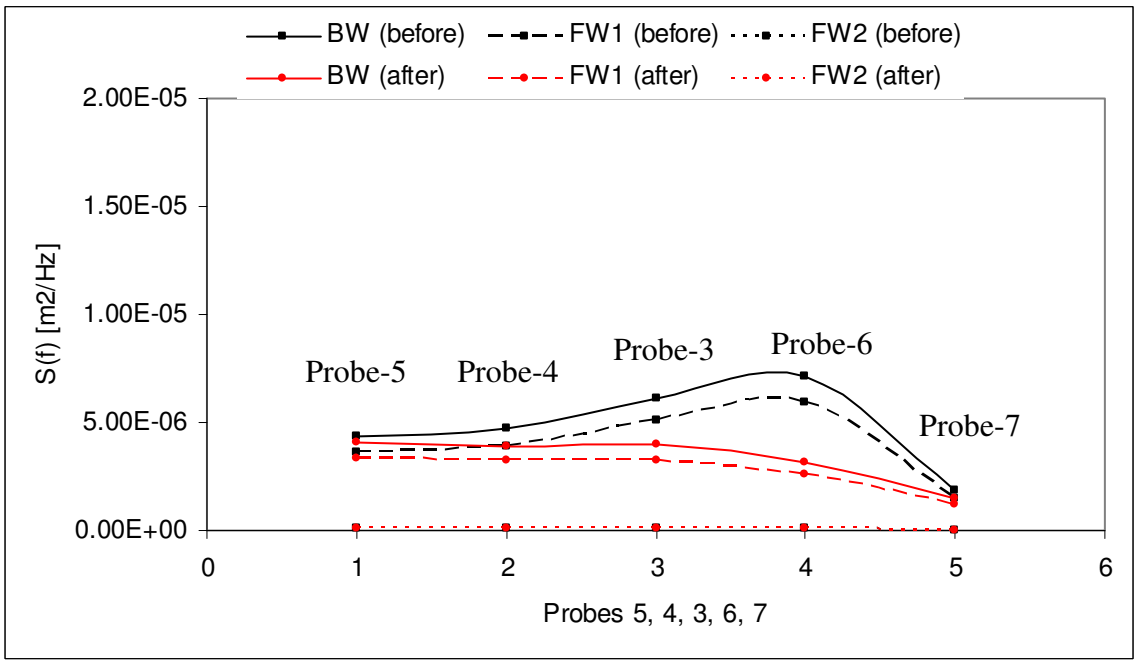

Fig. 38*d*: Cross-tank energy distribution for isolated second-order waves
M5-4: REGP5_H0P08_T3P704

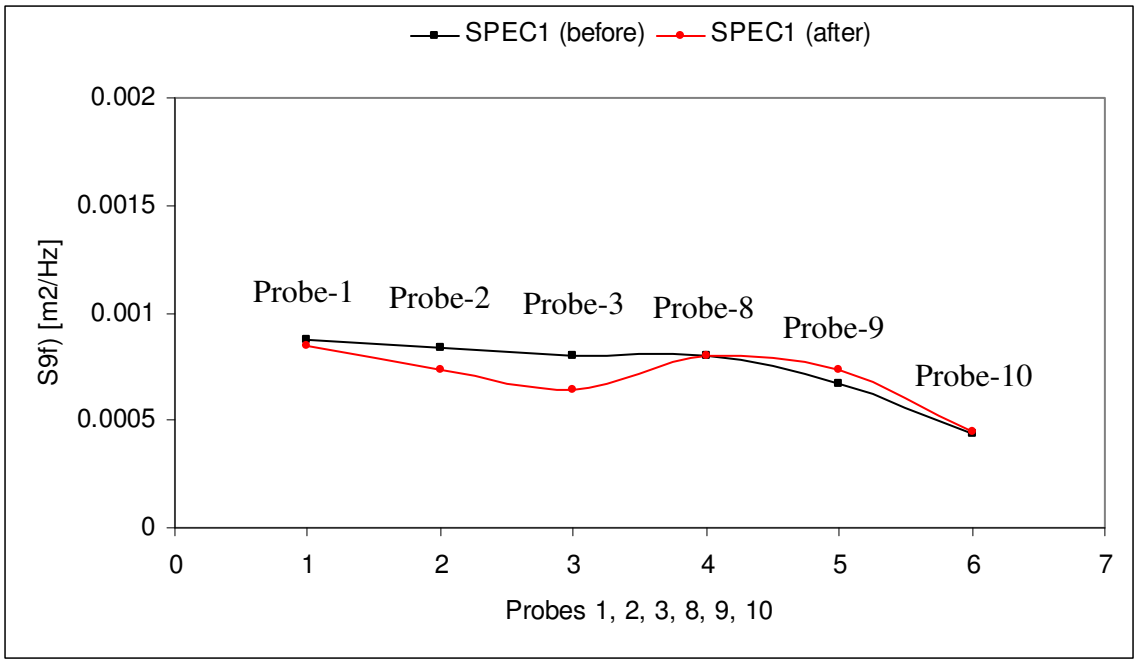

Fig. 38*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-4: REGP5_H0P08_T3P704

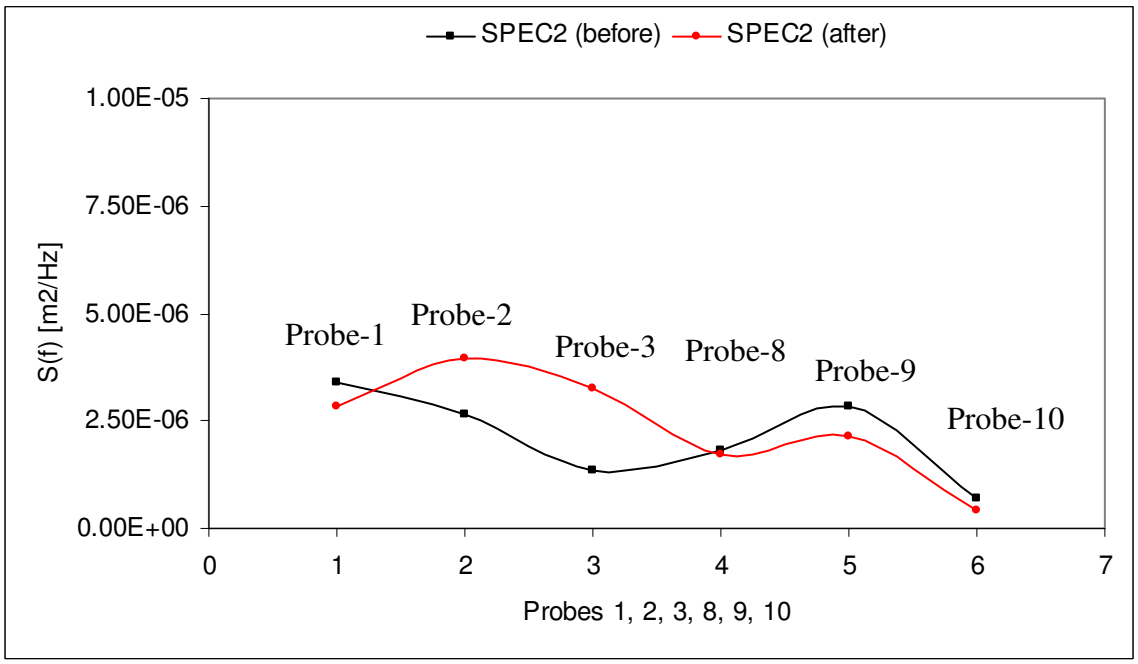

Fig. 38*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-4: REGP5_H0P08_T3P704

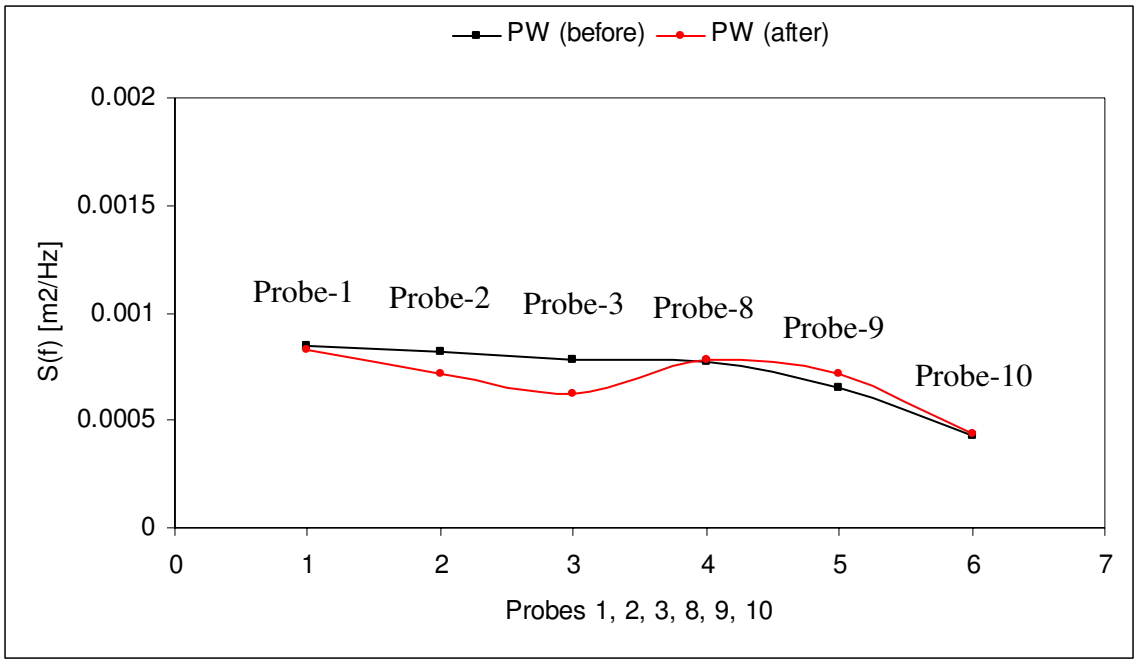

Fig. 38*g*: Along-tank energy distribution for isolated principal waves
M5-4: REGP5_H0P08_T3P70

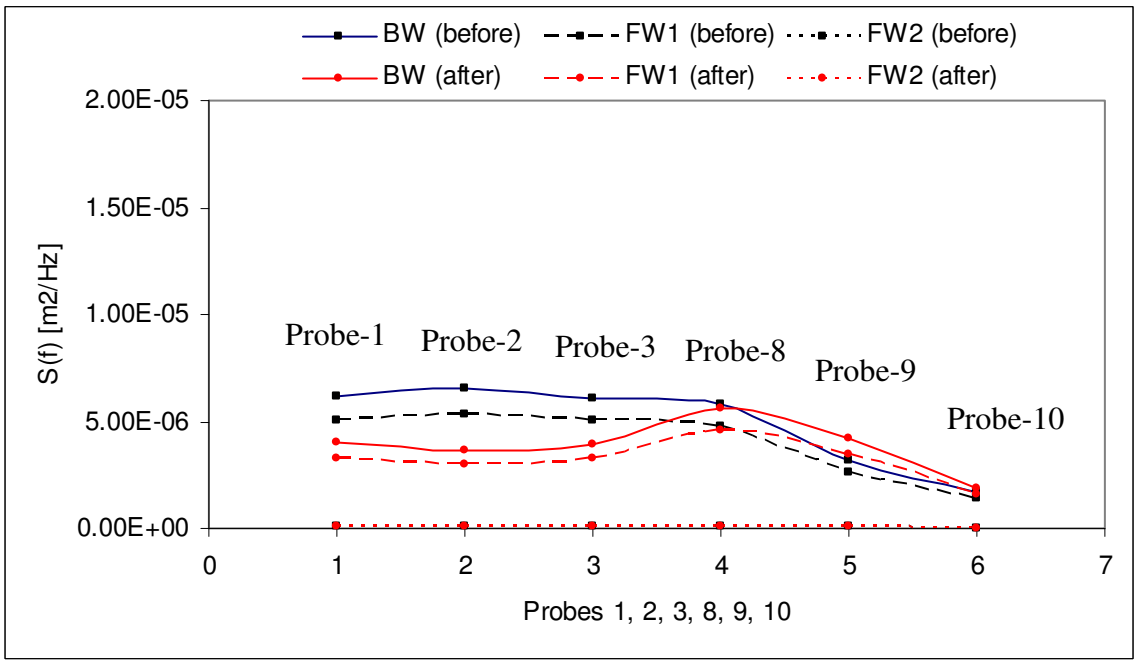

Fig. 38*h*: Along-tank energy distribution for isolated second-order waves
M5-4: REGP5_H0P08_T3P704

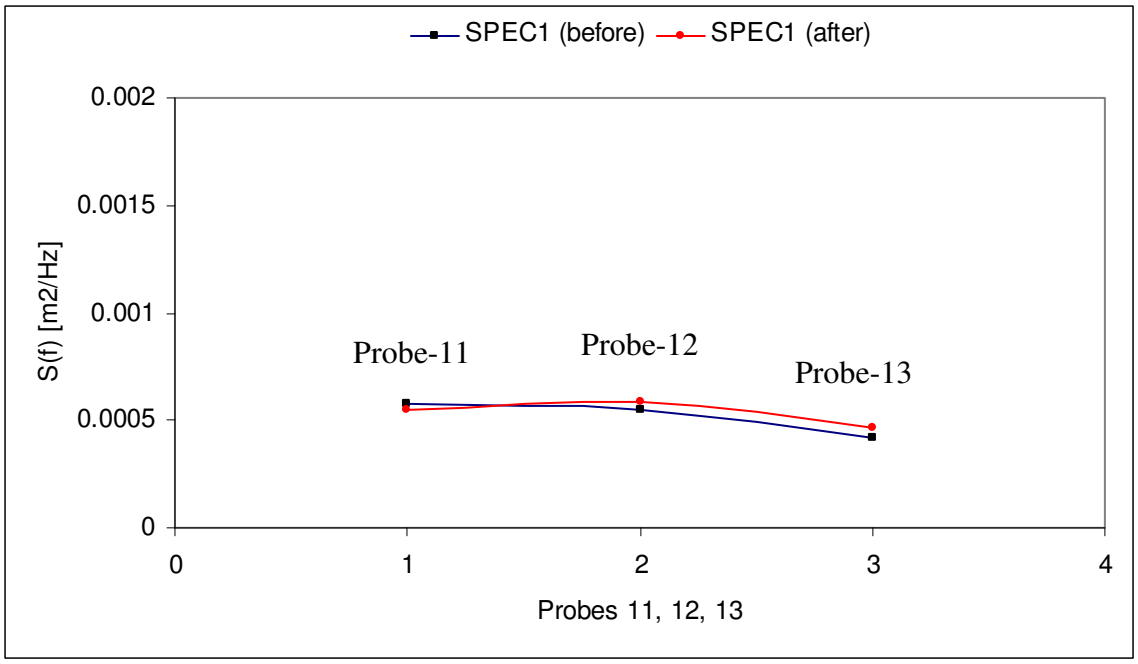

Fig. 38*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M5-4: REGP5_H0P08_T3P704

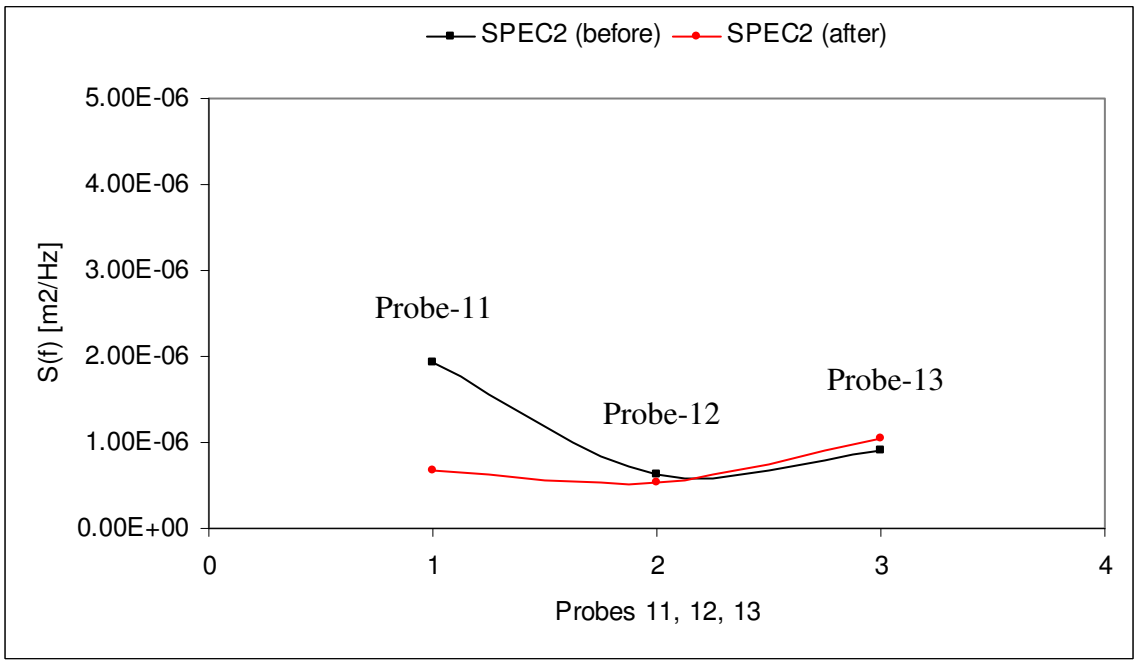

Fig. 38*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M5-4: REGP5_H0P08_T3P704

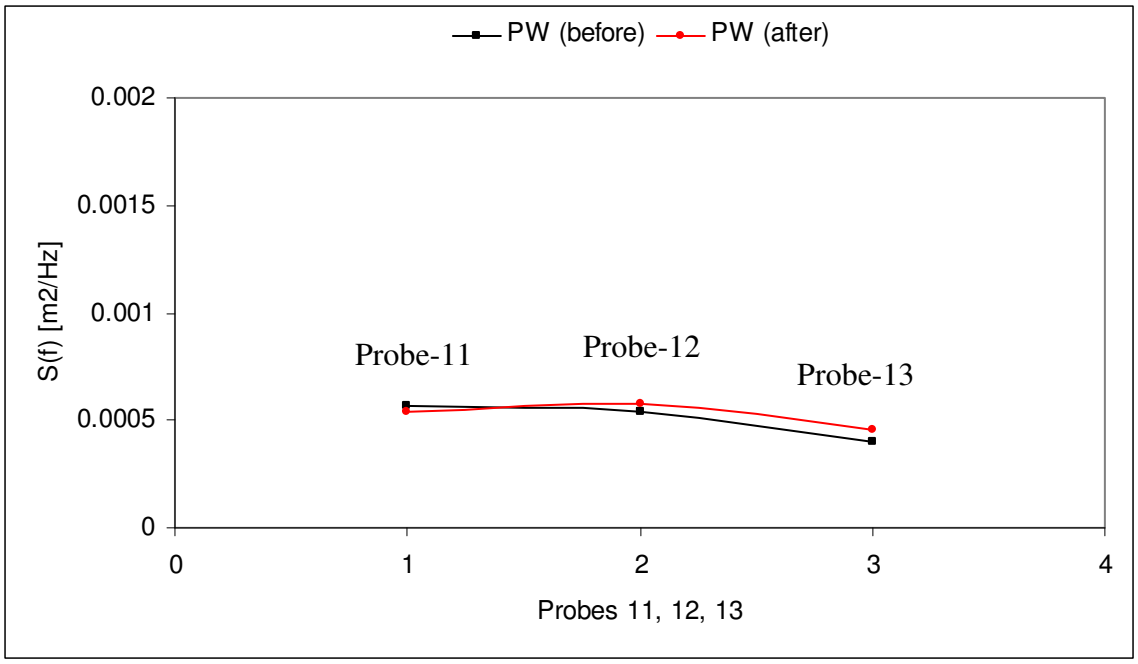

Fig. 38*k*: Cross-tank energy distribution for isolated principal waves
M5-4: REGP5_H0P08_T3P704

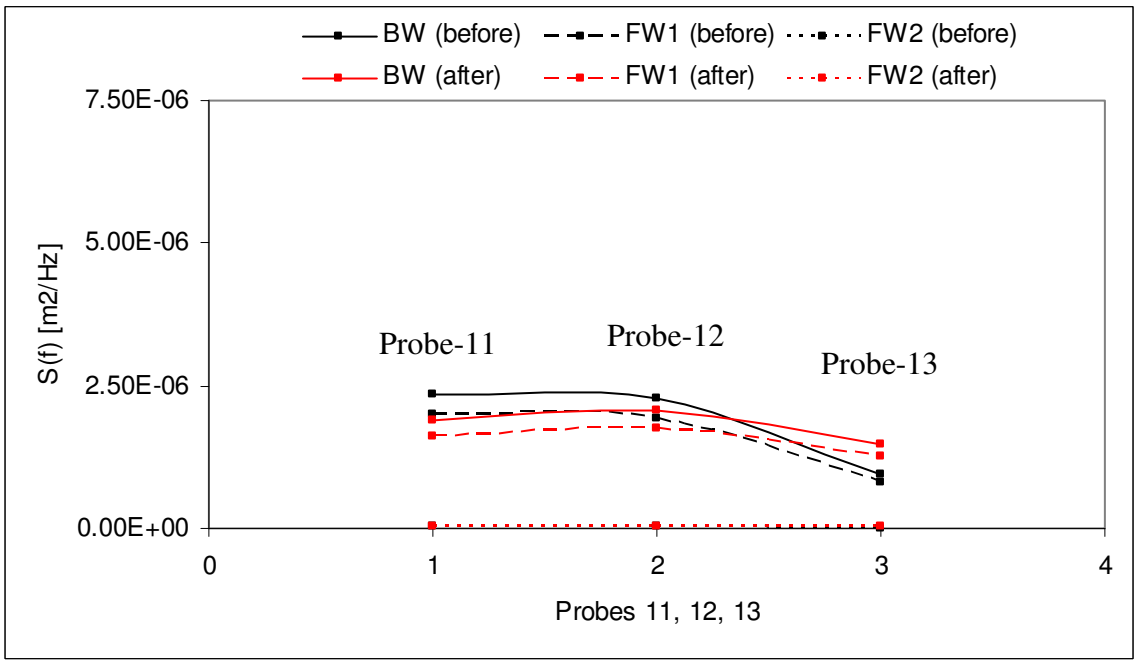

Fig. 38*l*: Cross-tank energy distribution for isolated second-order waves
M5-4: REGP5_H0P08_T3P704

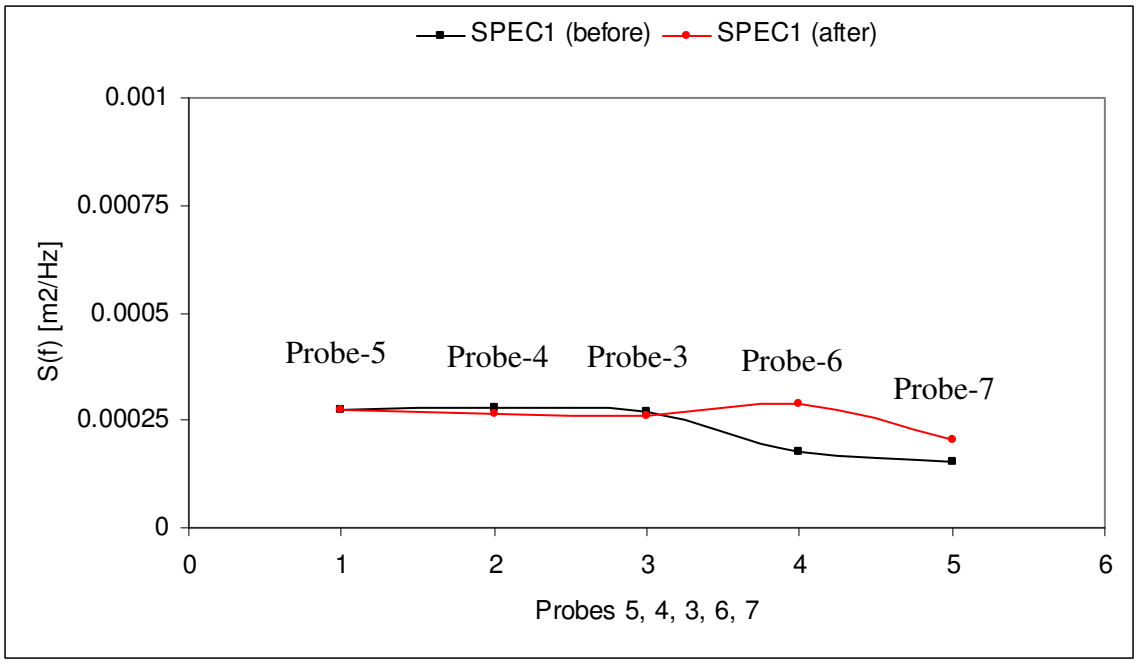

Fig. 39*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M8-1: REGP8_H0P06_T2P370

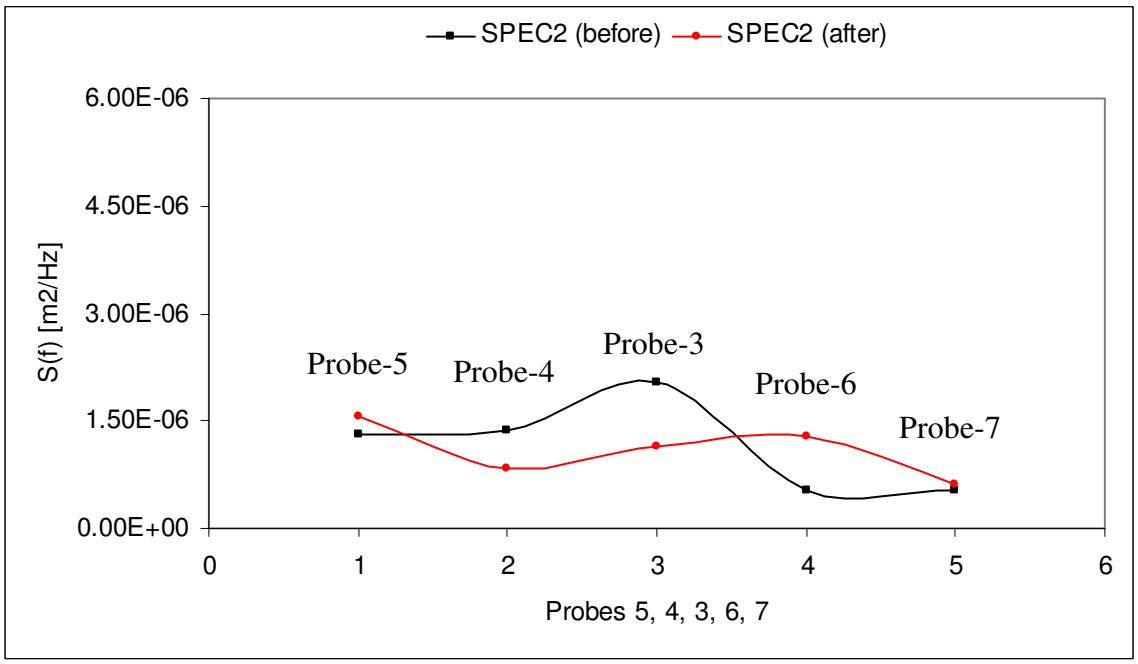

Fig. 39*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M8-1: REGP8_H0P06_T2P370

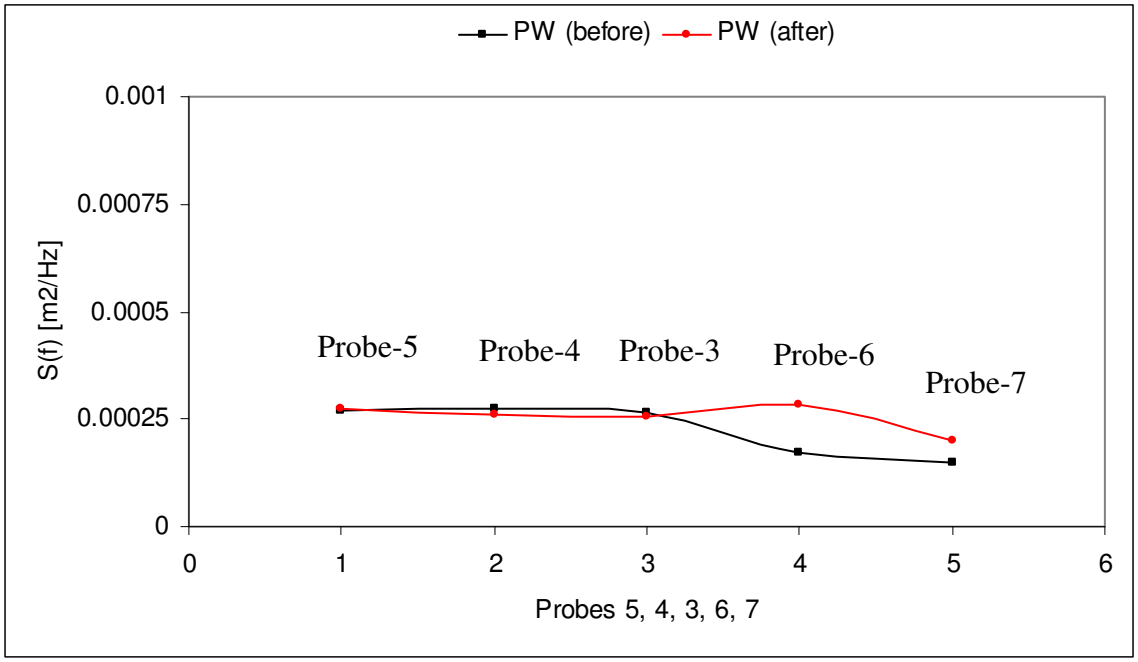

Fig. 39*c*: Cross-tank energy distribution for isolated principal waves
M8-1: REGP8_H0P06_T2P370

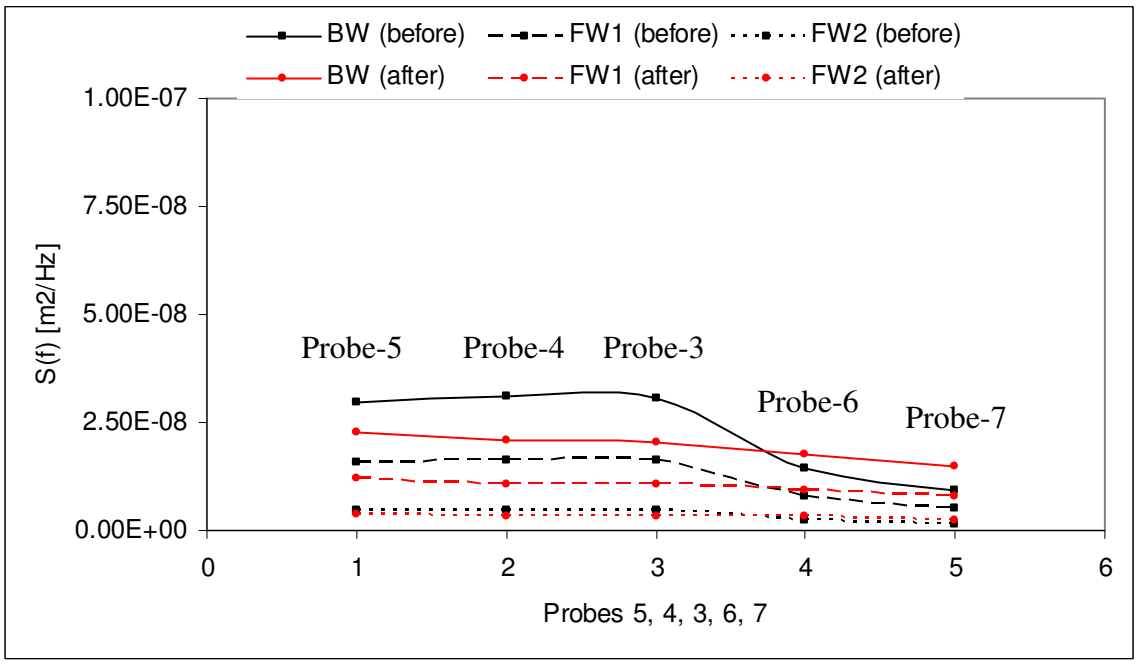

Fig. 39*d*: Cross-tank energy distribution for isolated second-order waves
M8-1: REGP8_H0P06_T2P370

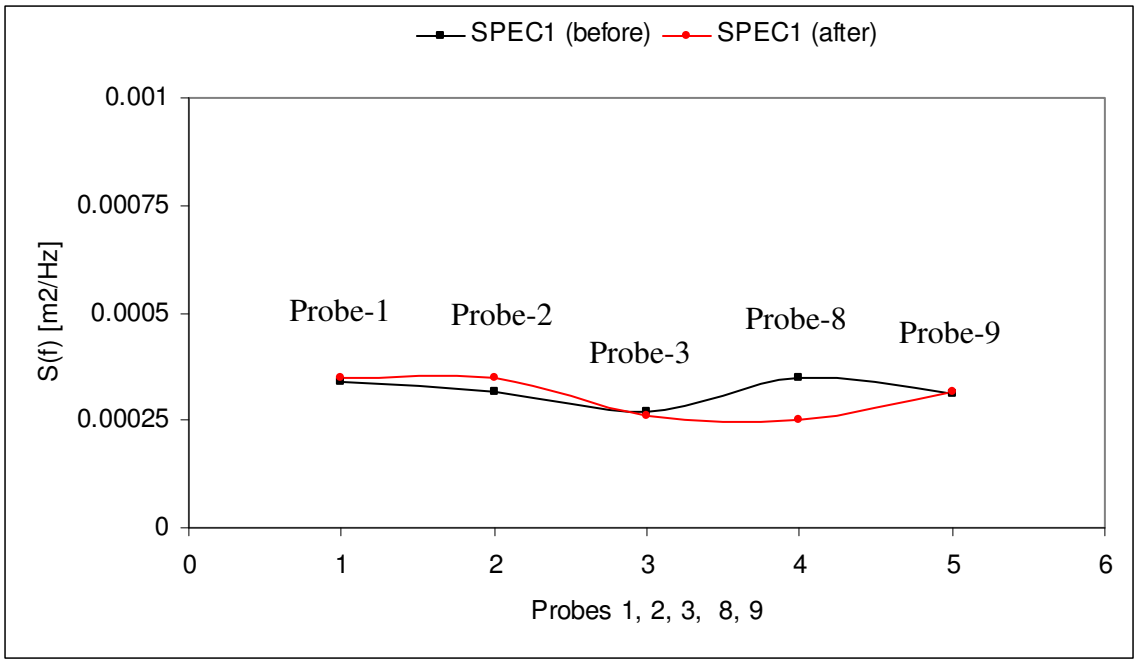

Fig. 39*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M8-1: REGP8_H0P06_T2P370

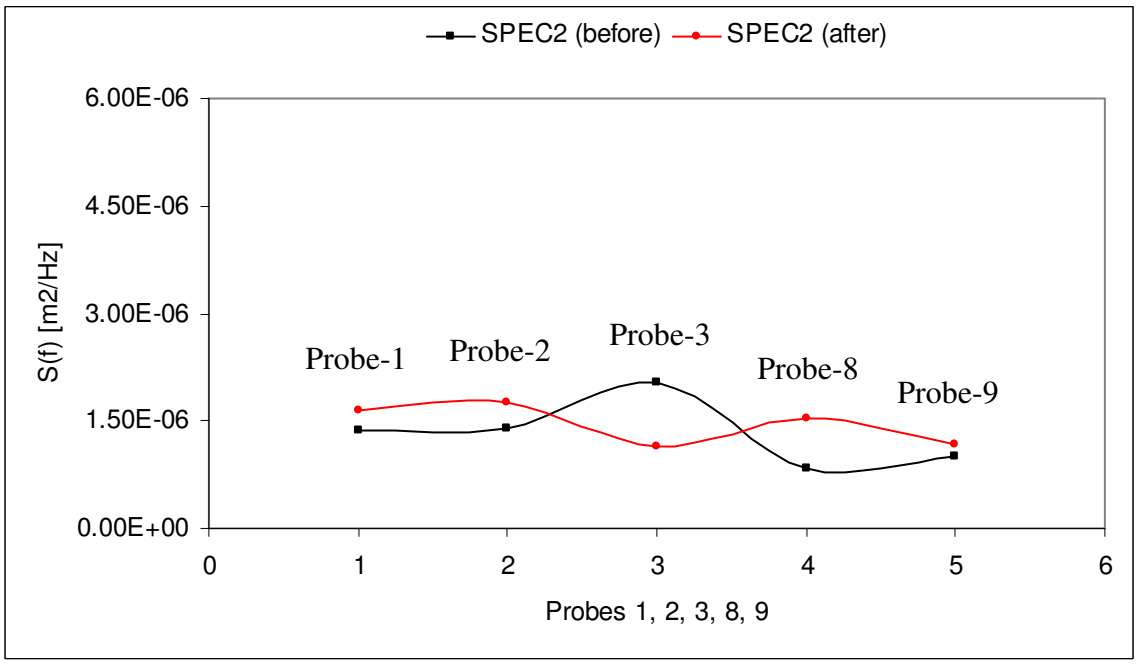

Fig. 39*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M8-1: REGP8_H0P06_T2P370

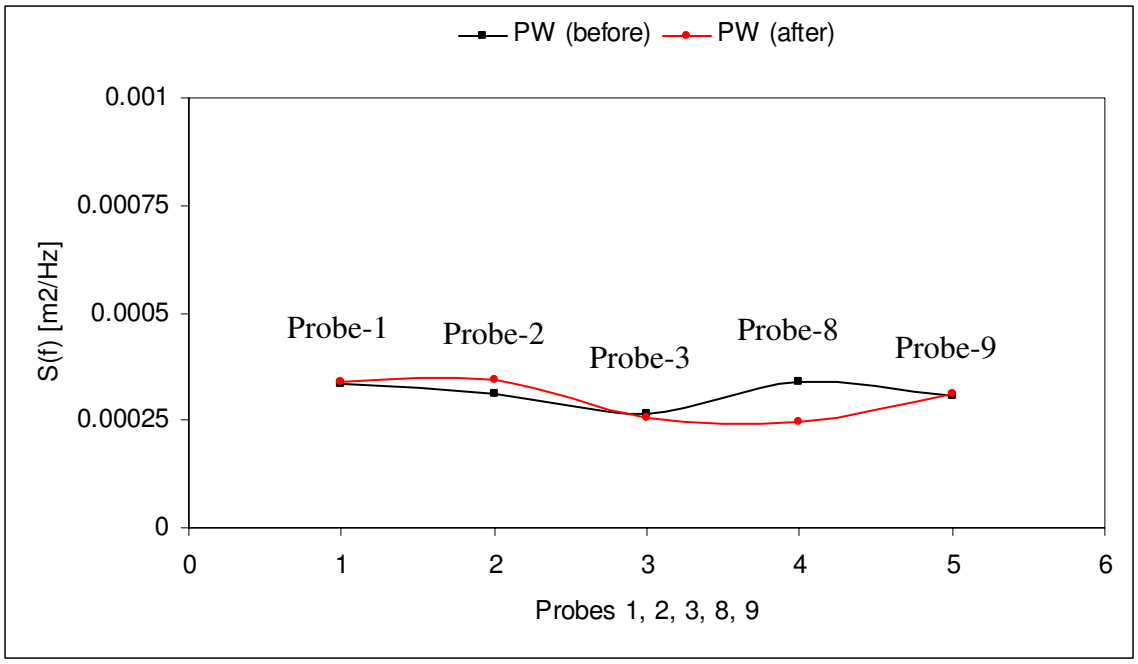

Fig. 39*g*: Along-tank energy distribution for isolated principal waves
M8-1: REGP8_H0P06_T2P370

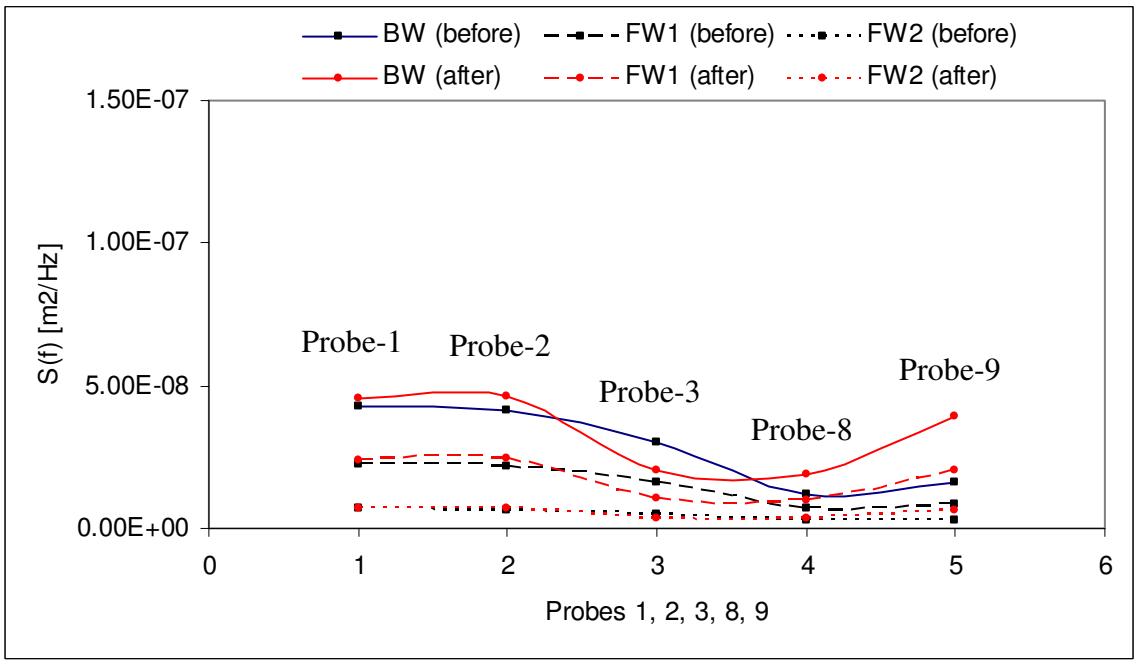

Fig. 39*h*: Along-tank energy distribution for isolated second-order waves
M8-1: REGP8_H0P06_T2P370

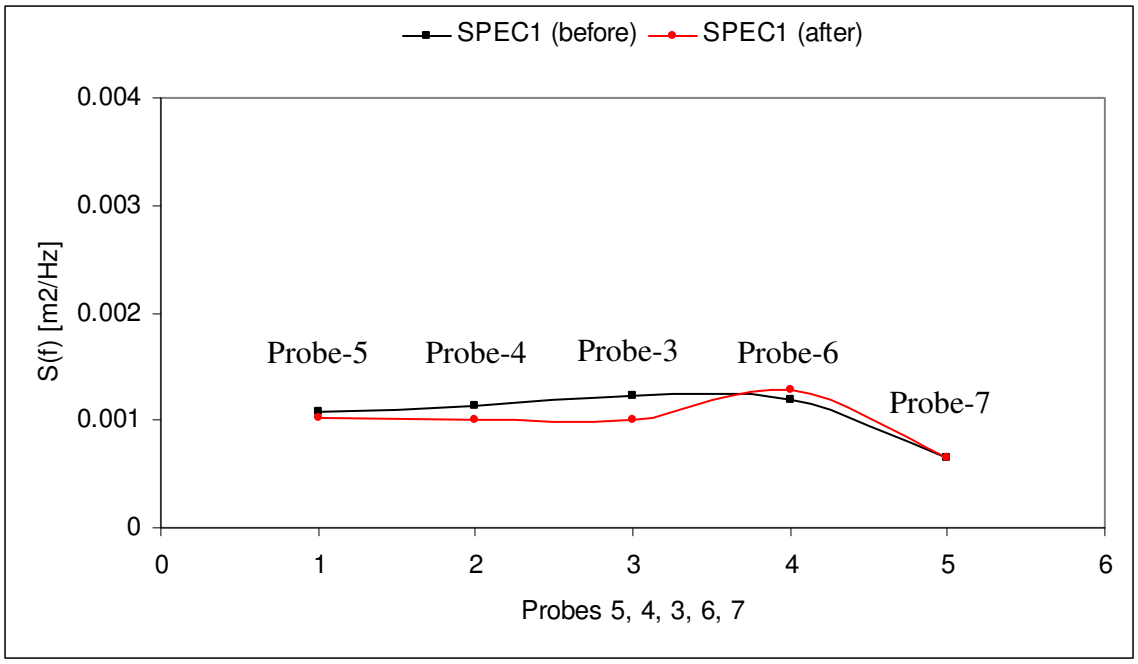

Fig. 40*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M8-2: REGP8_H0P08_T3P035

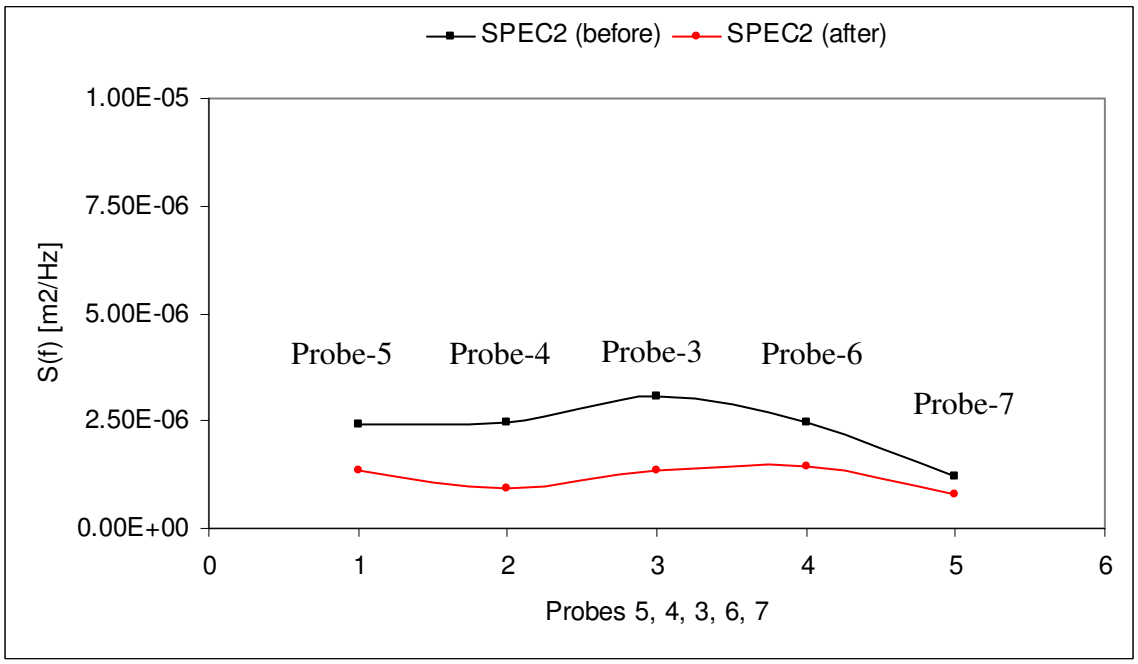

Fig. 40*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M8-2: REGP8_H0P08_T3P035

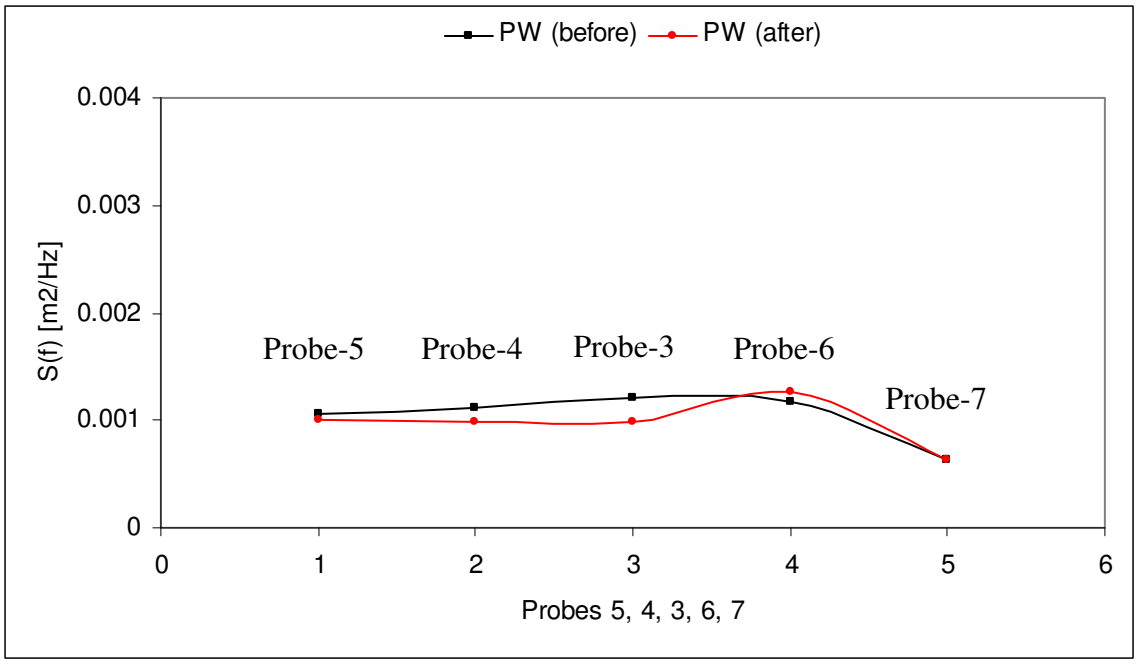

Fig. 40*c*: Cross-tank energy distribution for isolated principal waves
M8-2: REGP8_H0P08_T3P035

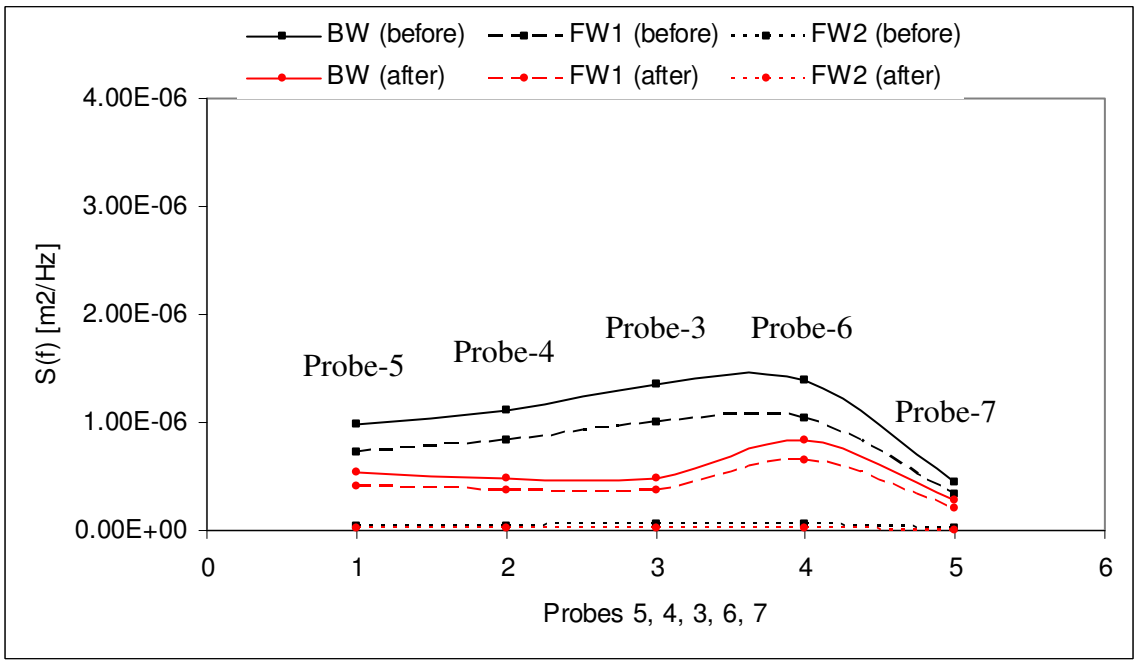

Fig. 40*d*: Cross-tank energy distribution for isolated second-order waves
M8-2: REGP8_H0P08_T3P035

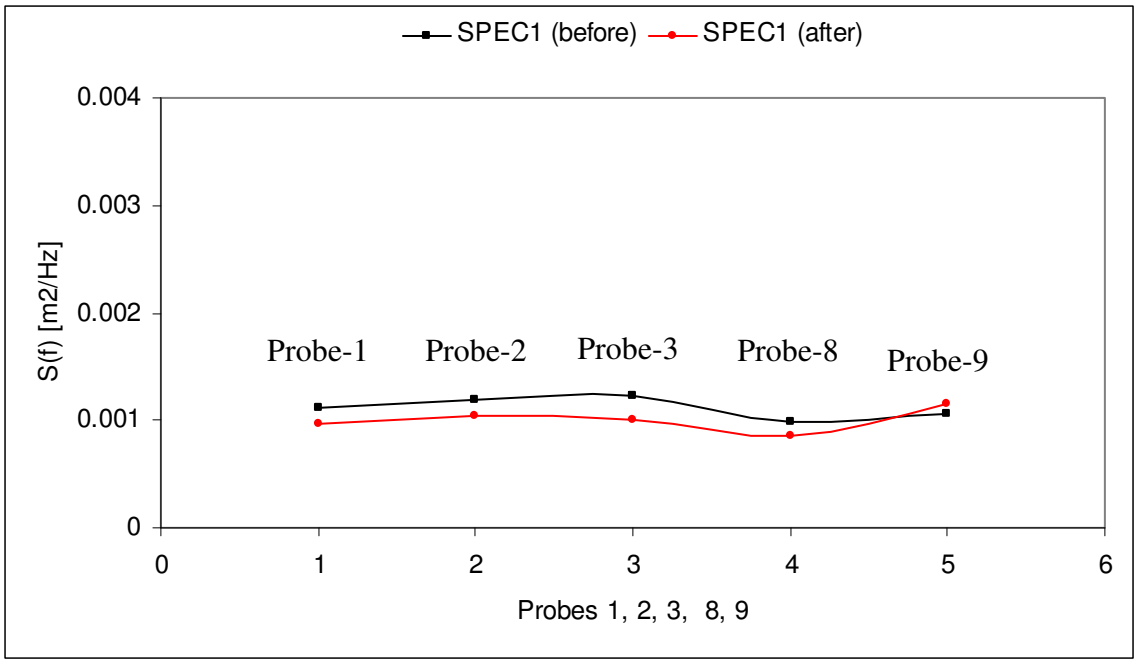

Fig. 40*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M8-2: REGP8_H0P08_T3P035

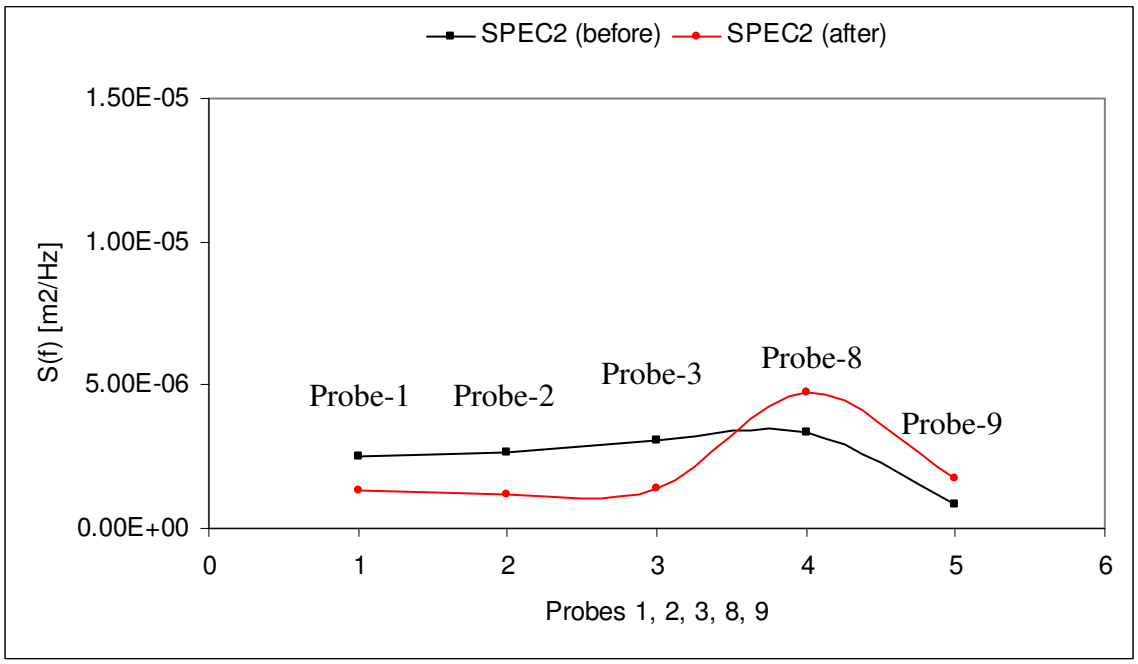

Fig. 40*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M8-2: REGP8_H0P08_T3P035

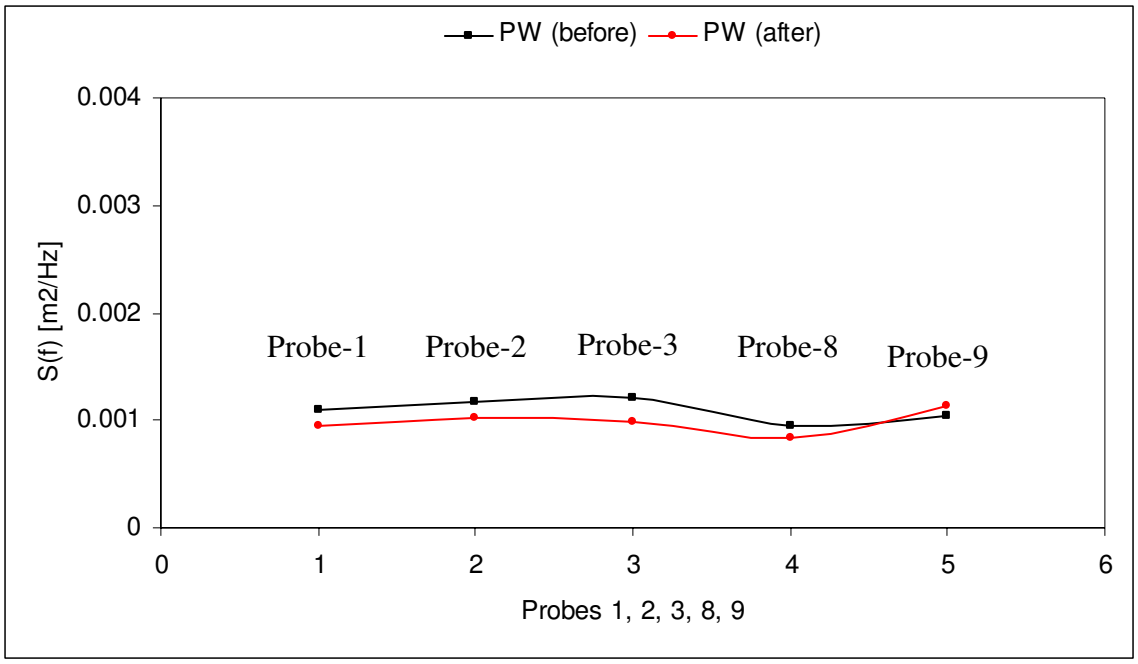

Fig. 40*g*: Along-tank energy distribution for isolated principal waves
M8-2: REGP8_H0P08_T3P035

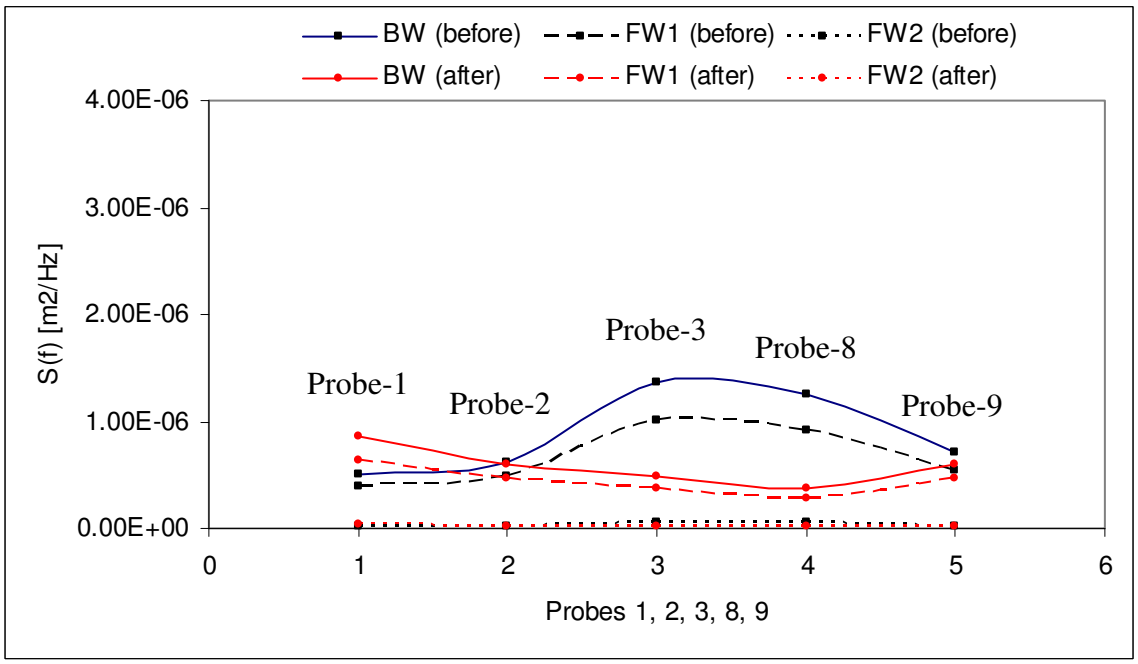

Fig. 40*h*: Along-tank energy distribution for isolated second-order waves
M8-2: REGP8_H0P08_T3P035

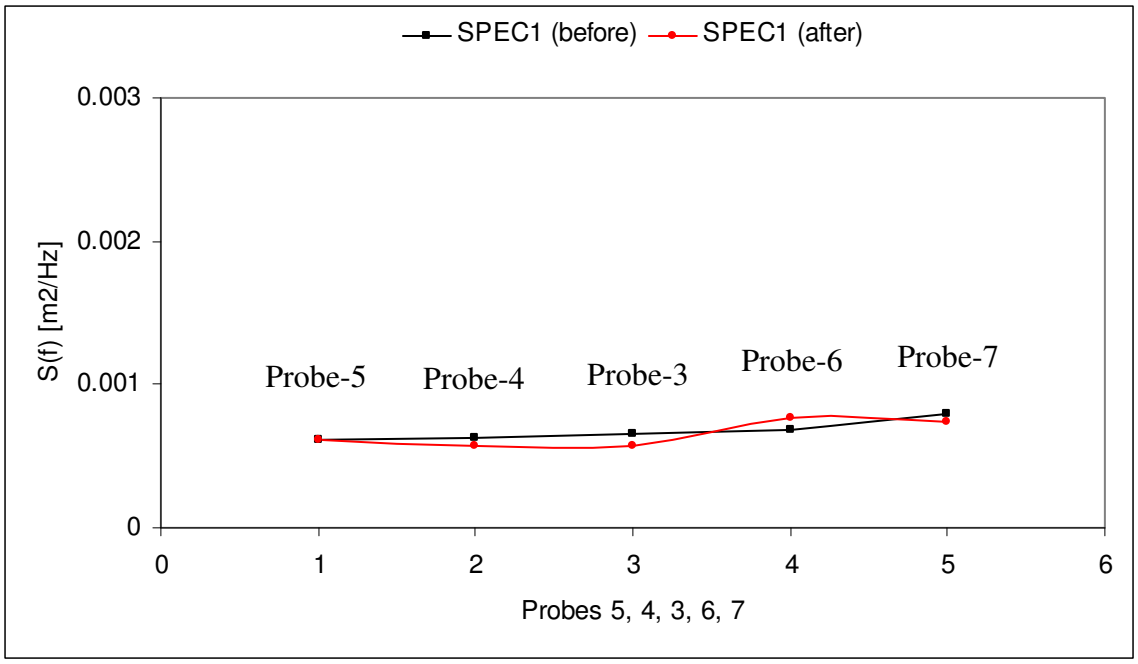

Fig. 41*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
M8-3: REGP8_H0P08_T4P105

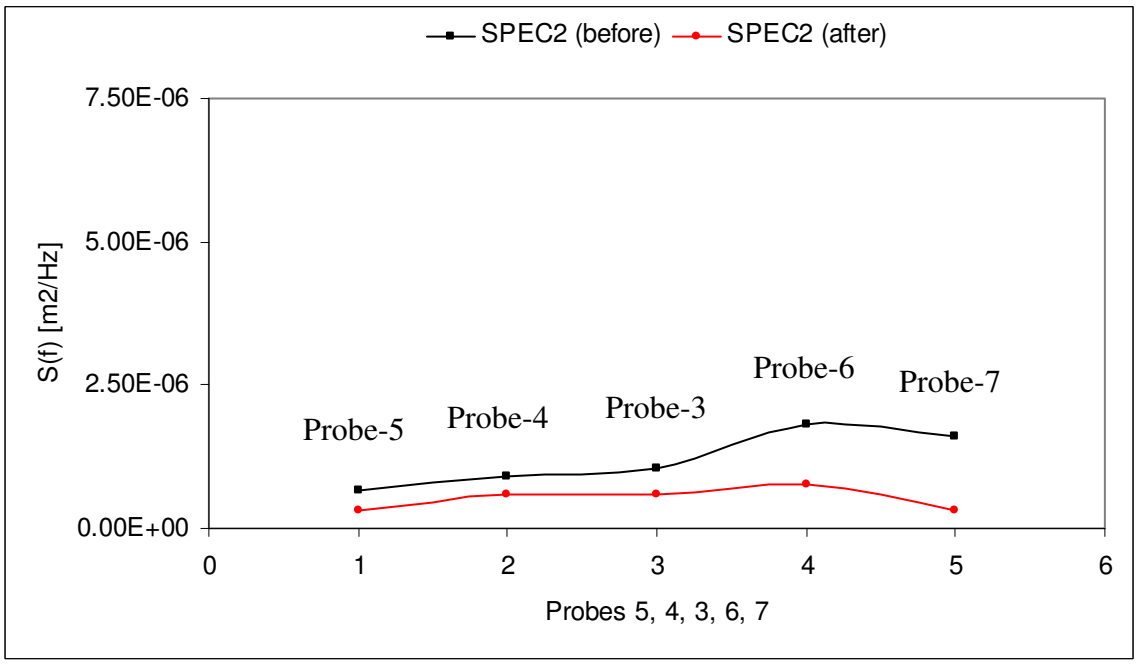

Fig. 41*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M8-3: REGP8_H0P08_T4P105

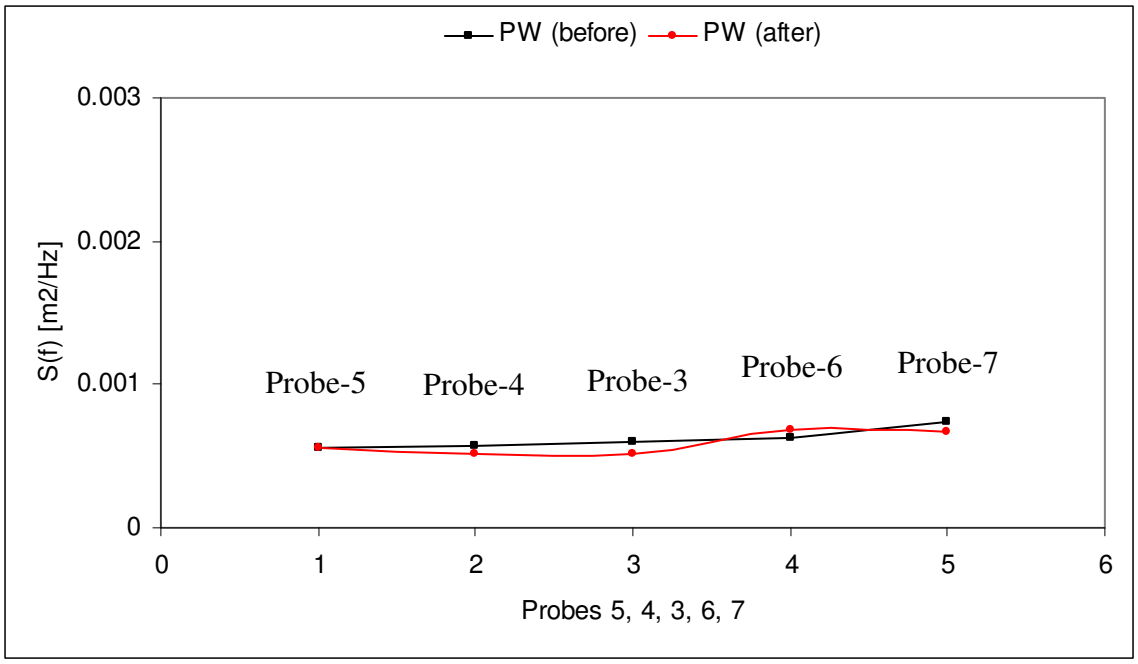

Fig. 41*c*: Cross-tank energy distribution for isolated principal waves
M8-3: REGP8_H0P08_T4P105

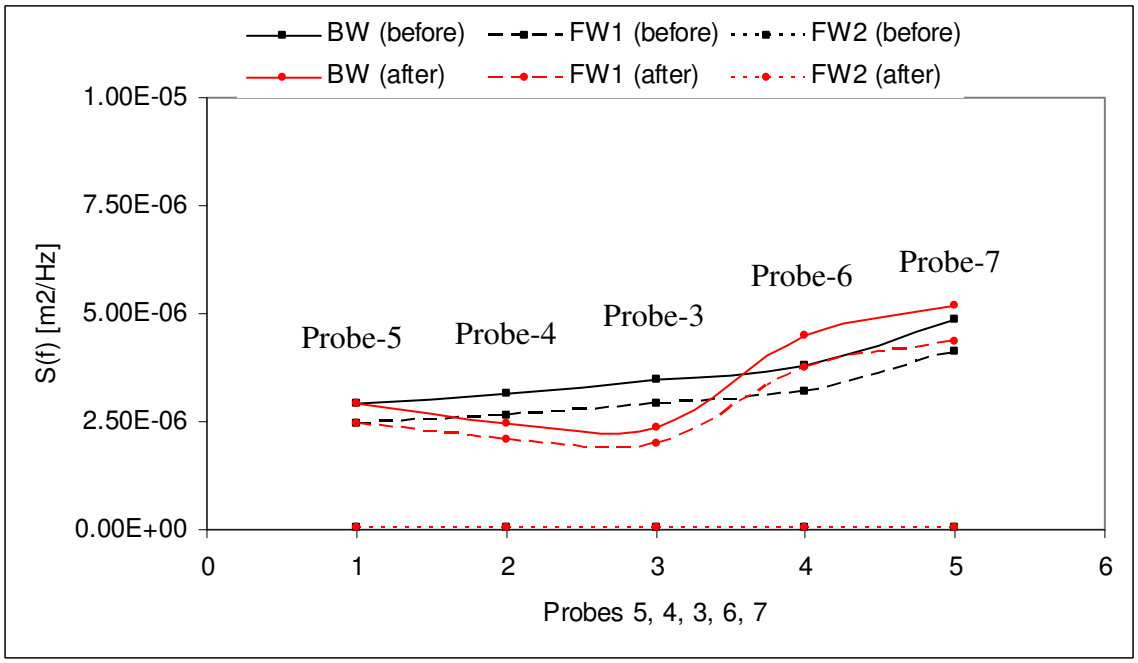

Fig. 41*d*: Cross-tank energy distribution for isolated second-order waves
M8-3: REGP8_H0P08_T4P105

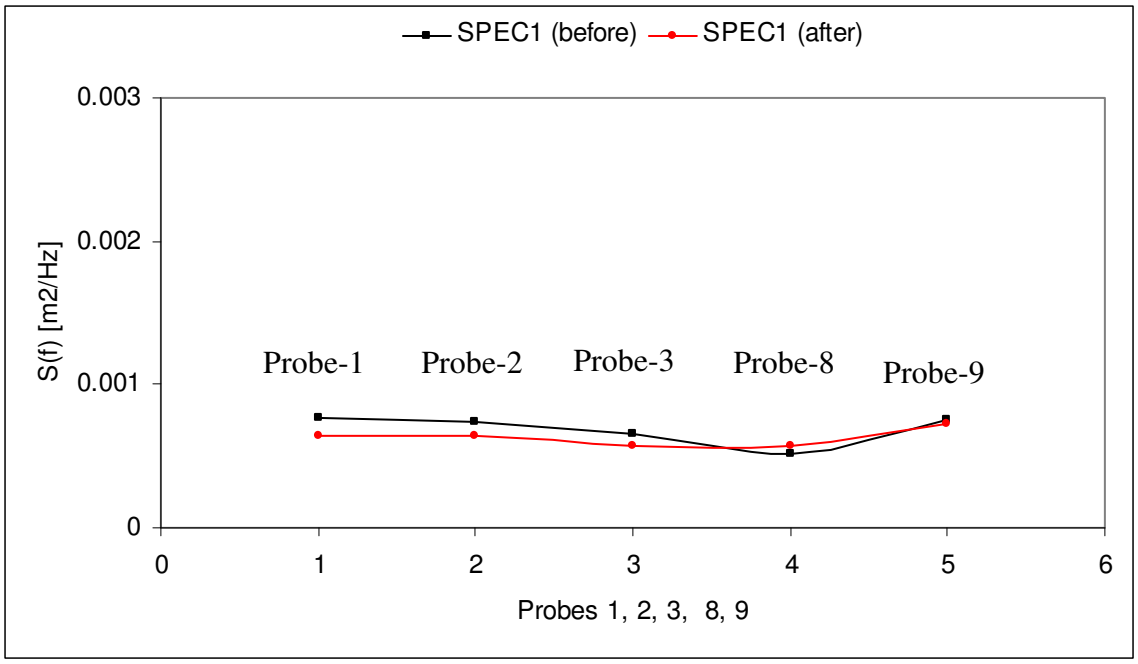

Fig. 41*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
M8-3: REGP8_H0P08_T4P105

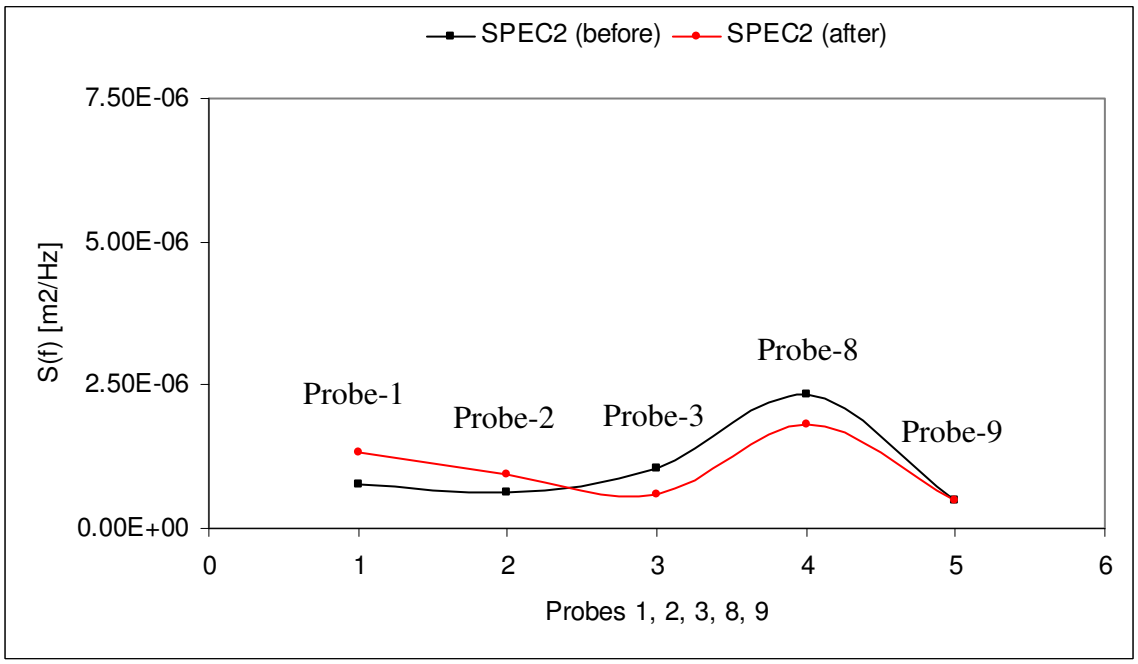

Fig. 41*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
M8-3: REGP8_H0P08_T4P105

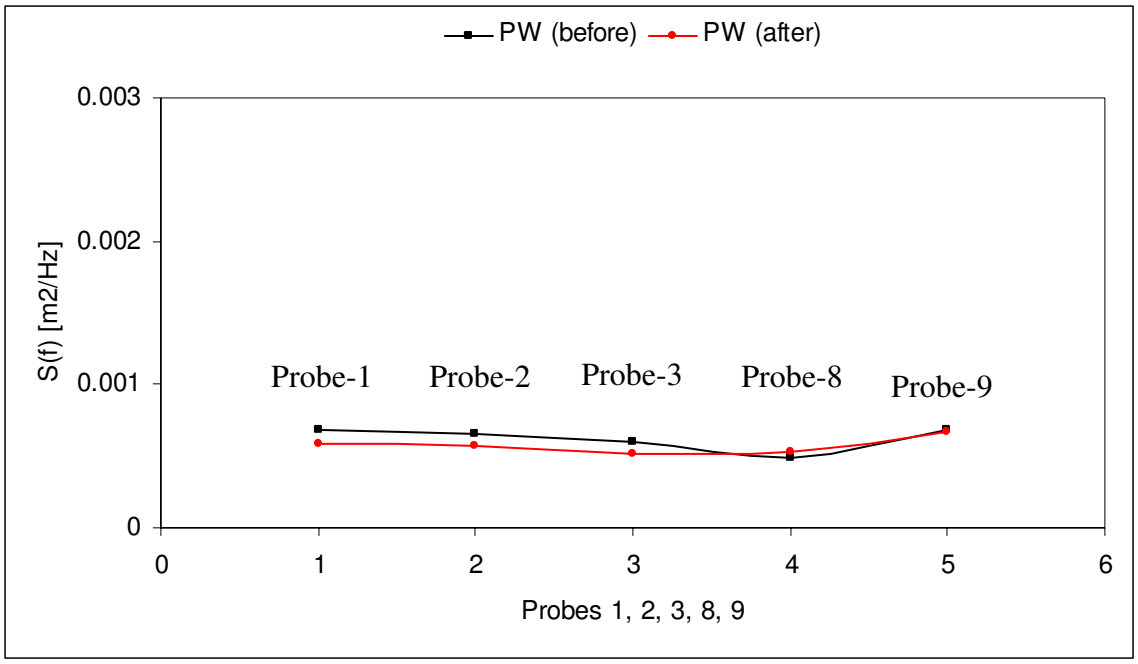

Fig. 41*g*: Along-tank energy distribution for isolated principal waves
M8-3: REGP8_H0P08_T4P105

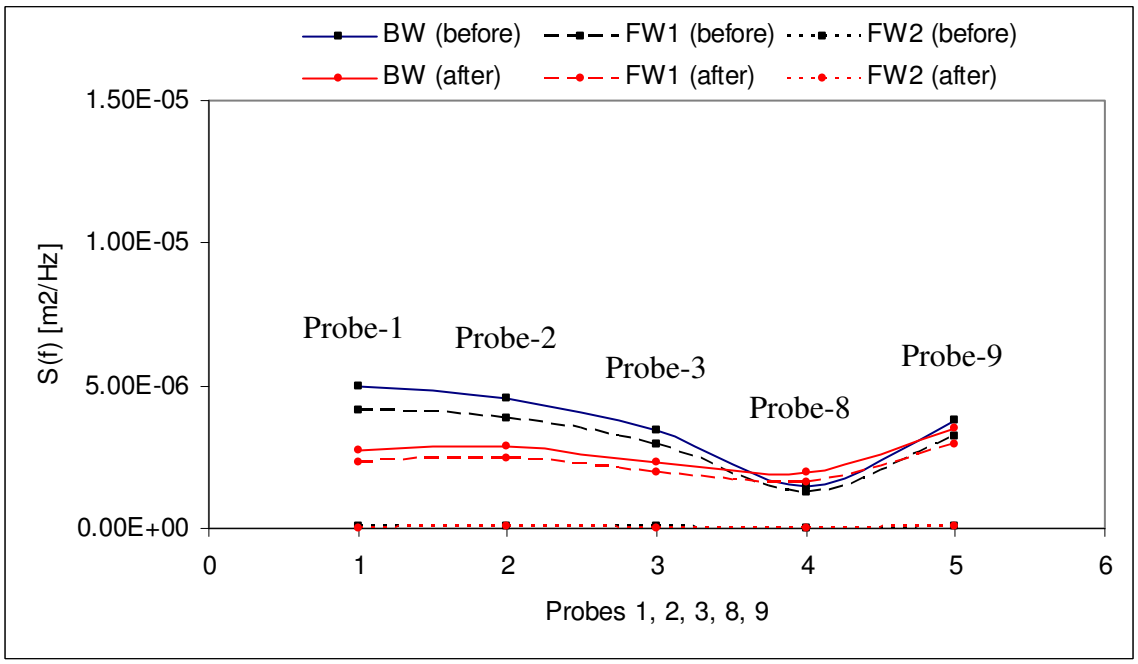

Fig. 41*h*: Along-tank energy distribution for isolated second-order waves
M8-3: REGP8_H0P08_T4P105

APPENDIX - IV

Energy distributions for measured waves (SPEC1 and SPEC2), isolated Primary Waves (PW), Bounded Wave (BW), Free Wave-1 (FW1) and Free Wave-2 (FW2) for bi-chromatic waves

Probes array:

Probes: 5-4-3-6-7
Probes: 11-12-13
Probes 1-2-3-8-9-10

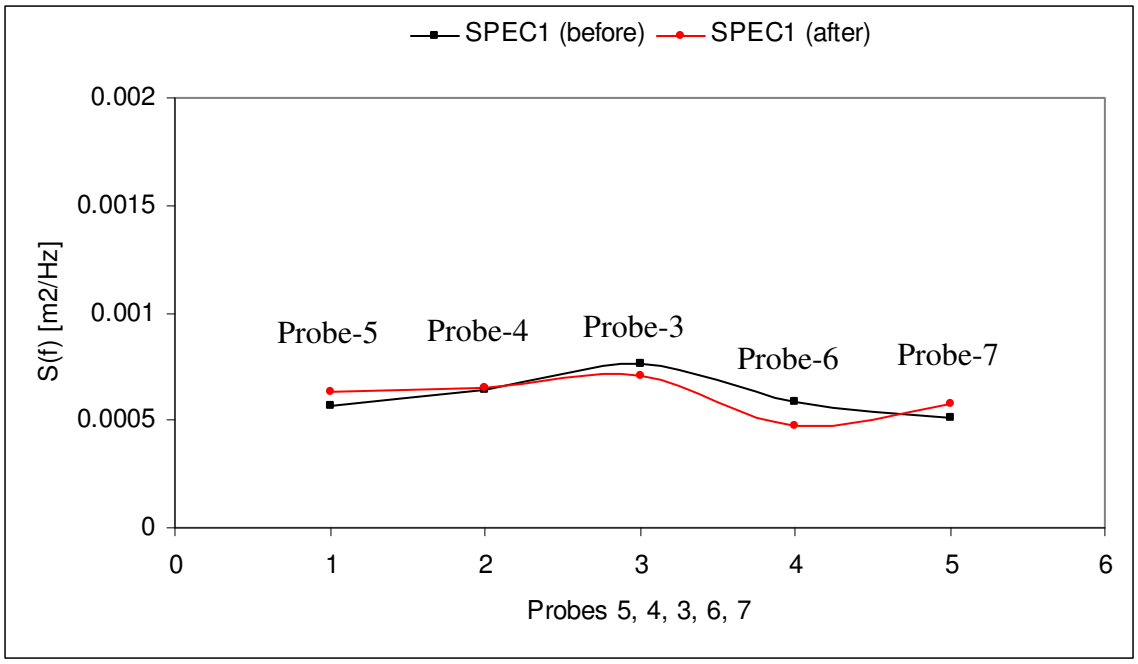

Fig. 42*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-1: BIP4_H0P06_T1P25_T1P17

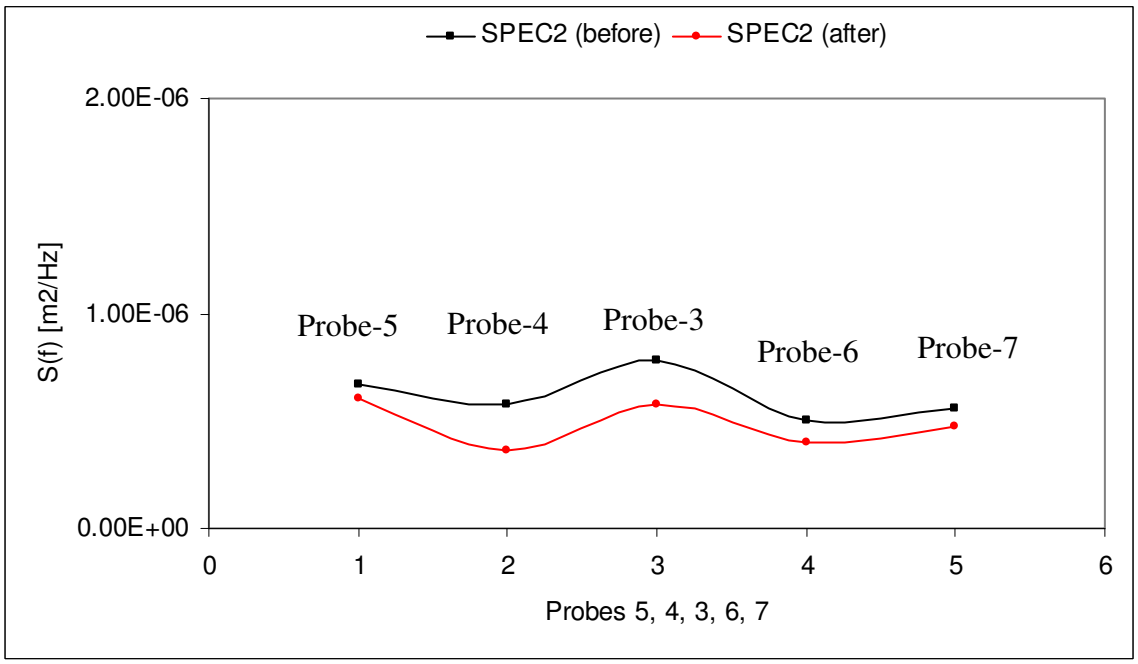

Fig. 42*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-1: BIP4_H0P06_T1P25_T1P17

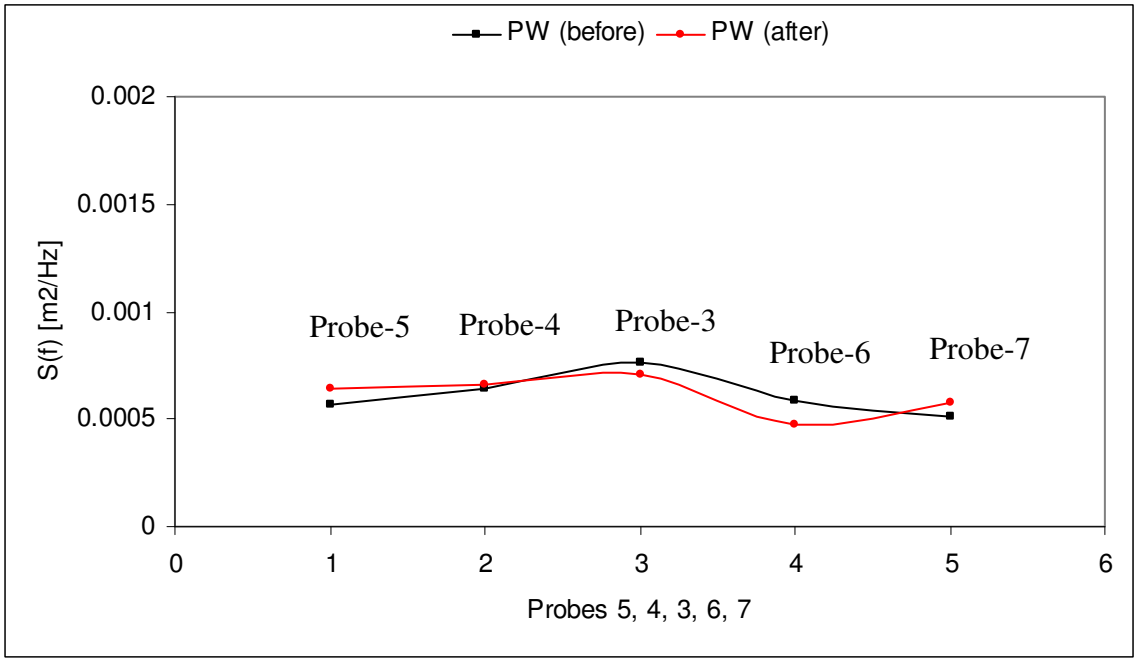

Fig. 42*c*: Cross-tank energy distribution for isolated principal waves
B4-1: BIP4_H0P06_T1P25_T1P17

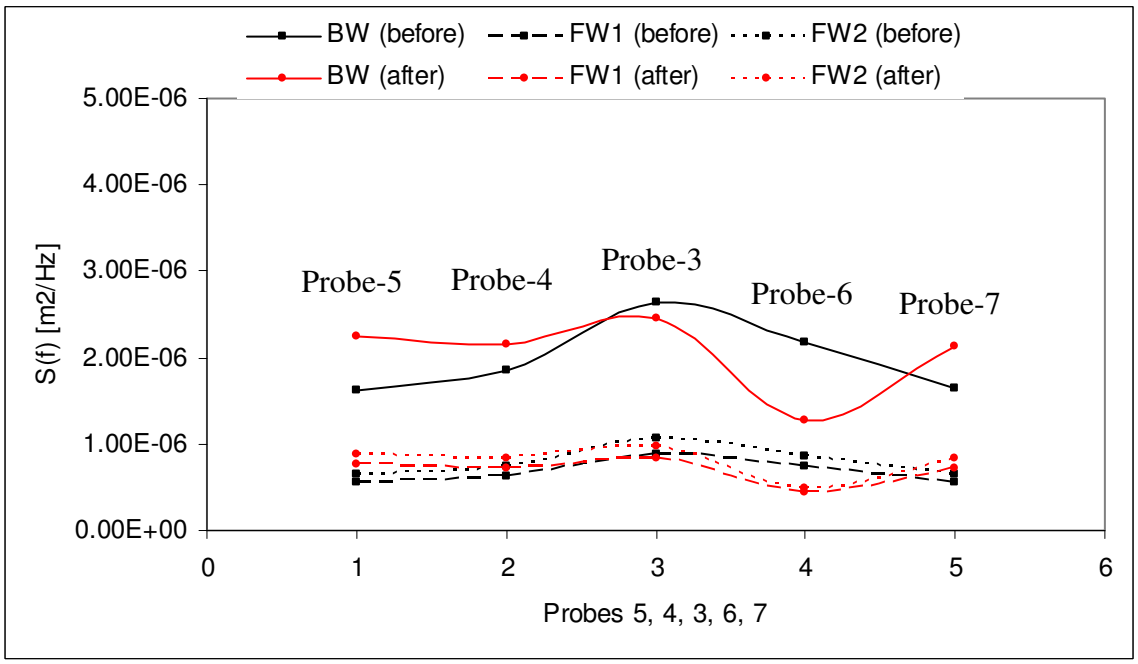

Fig. 42*d*: Cross-tank energy distribution for isolated second-order waves
B4-1: BIP4_H0P06_T1P25_T1P17

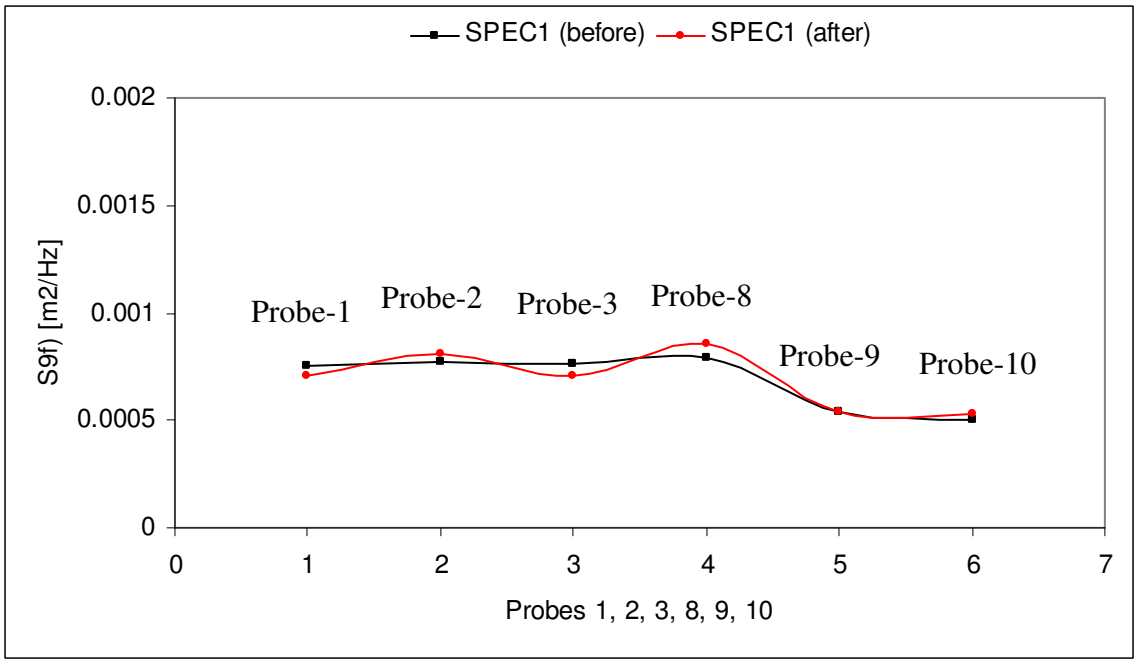

Fig. 42*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-1: BIP4_H0P06_T1P25_T1P17

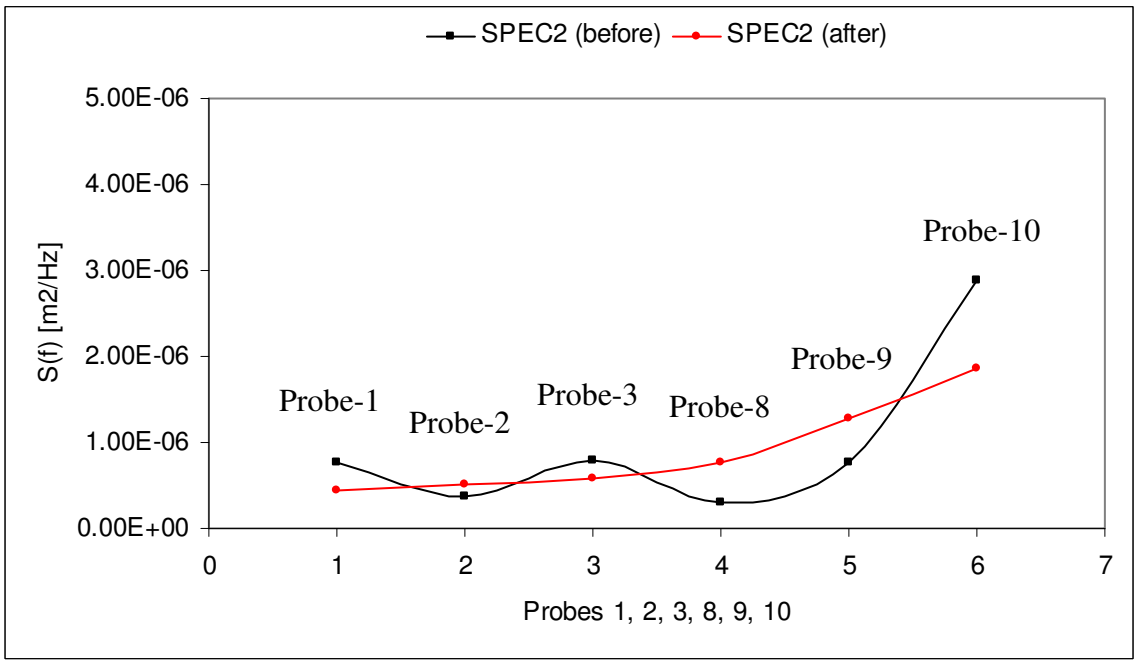

Fig. 42*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-1: BIP4_H0P06_T1P25_T1P17

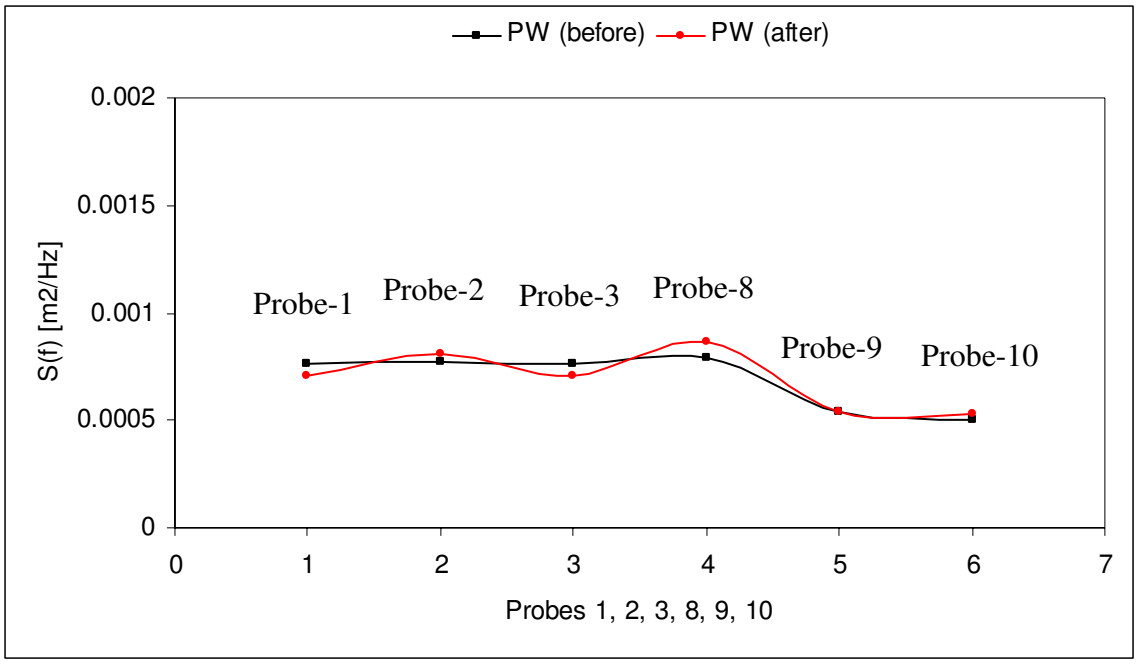

Fig. 42*g*: Along-tank energy distribution for isolated principal waves
B4-1: BIP4_H0P06_T1P25_T1P17

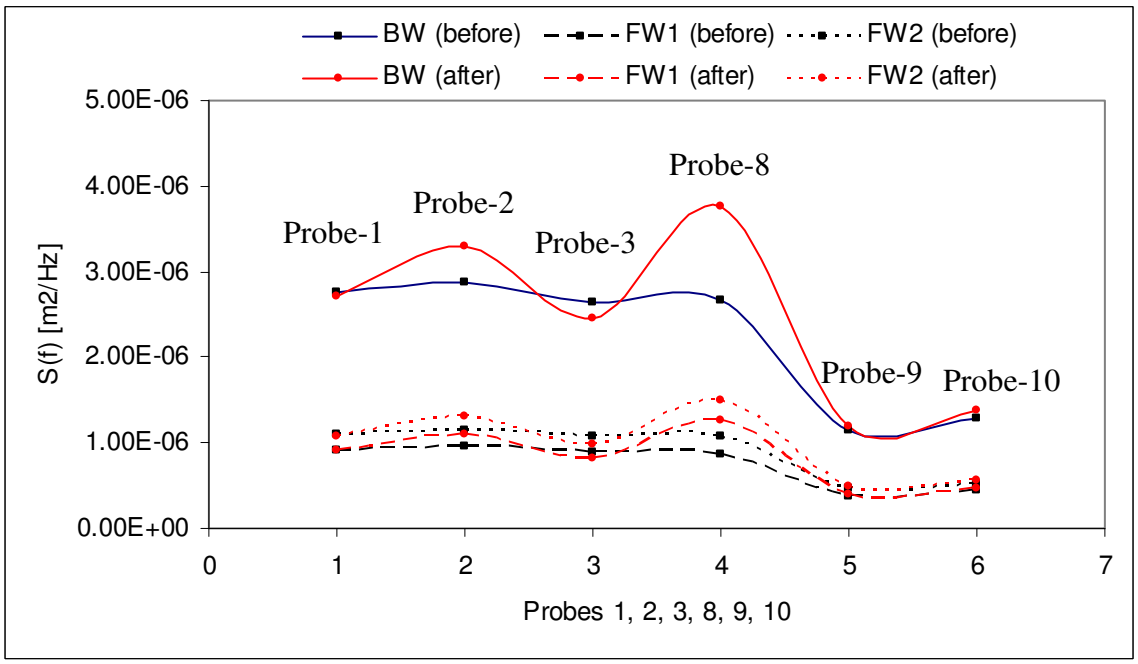

Fig. 42*h*: Along-tank energy distribution for isolated second-order waves
B4-1: BIP4_H0P06_T1P25_T1P17

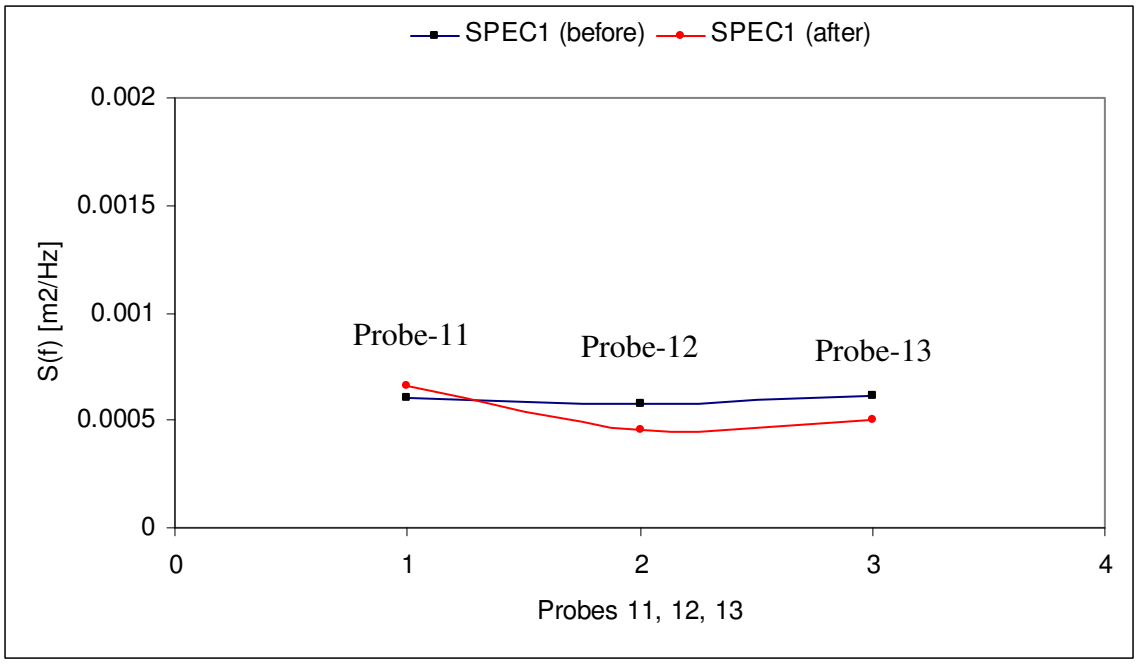

Fig. 42*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-1: BIP4_H0P06_T1P25_T1P17

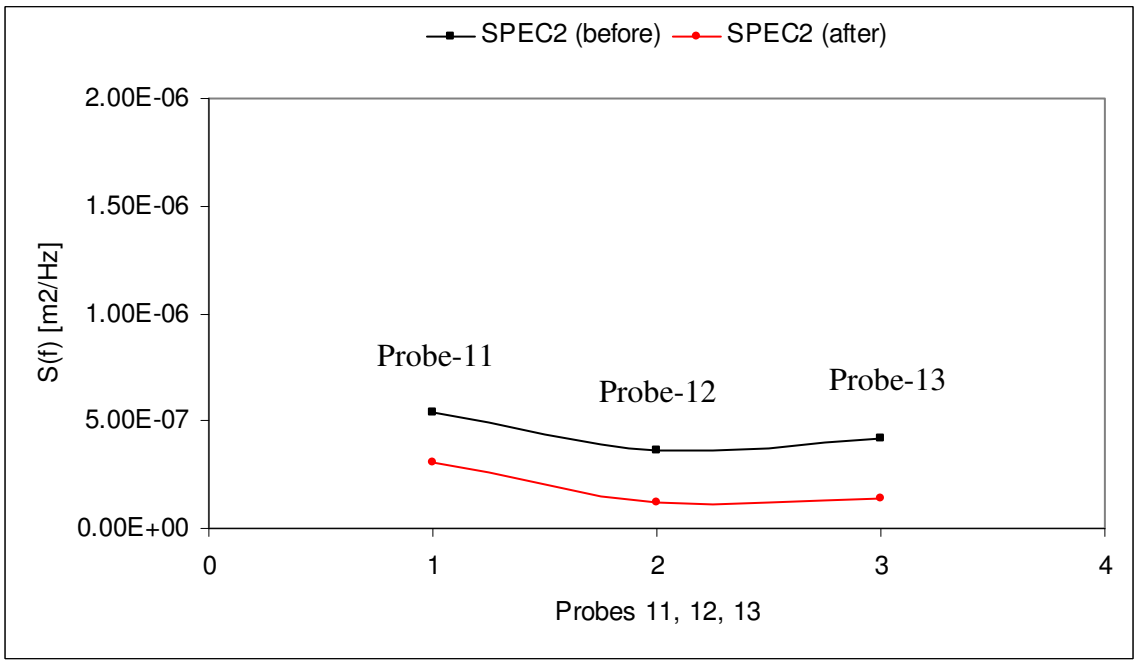

Fig. 42*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-1: BIP4_H0P06_T1P25_T1P17

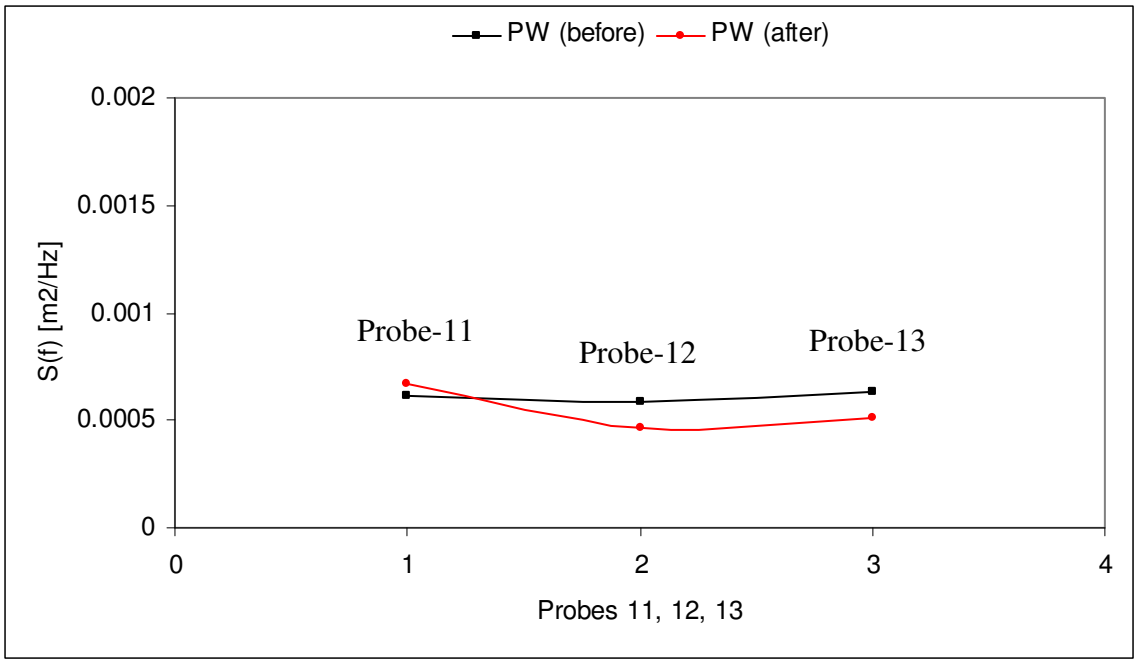

Fig. 42*k*: Cross-tank energy distribution for isolated principal waves
B4-1: BIP4_H0P06_T1P25_T1P17

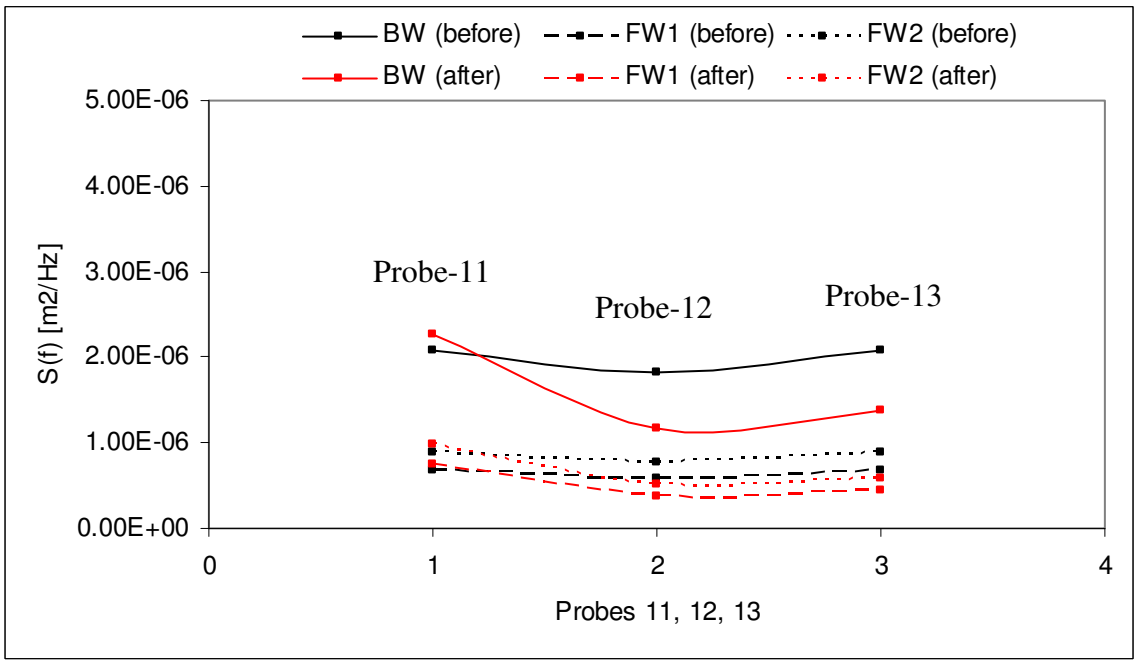

Fig. 42*l*: Cross-tank energy distribution for isolated second-order waves
B4-1: BIP4_H0P06_T1P25_T1P17

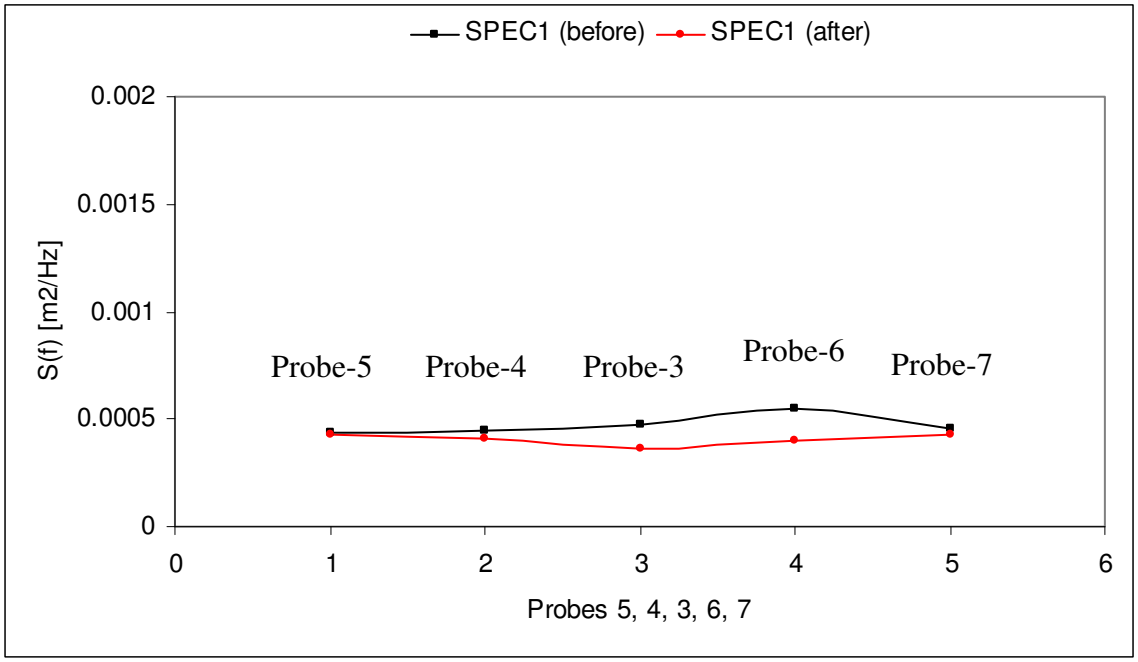

Fig. 43*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-1: BIP4_H0P06_T1P55_T1P45

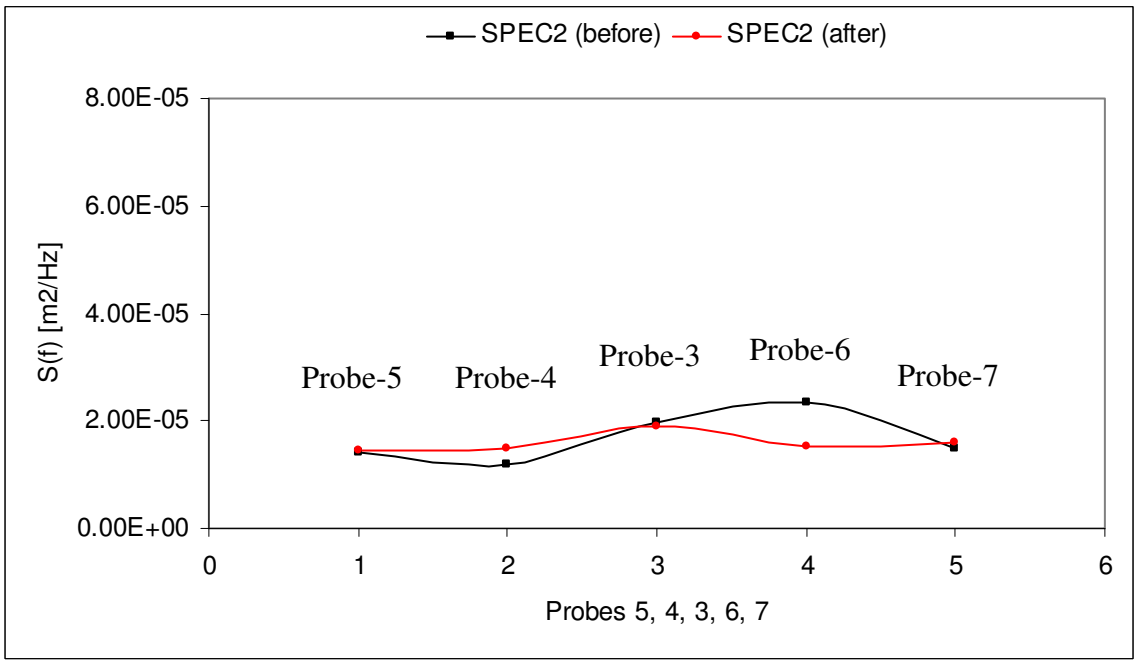

Fig. 43*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-2: BIP4_H0P06_T1P55_T1P45

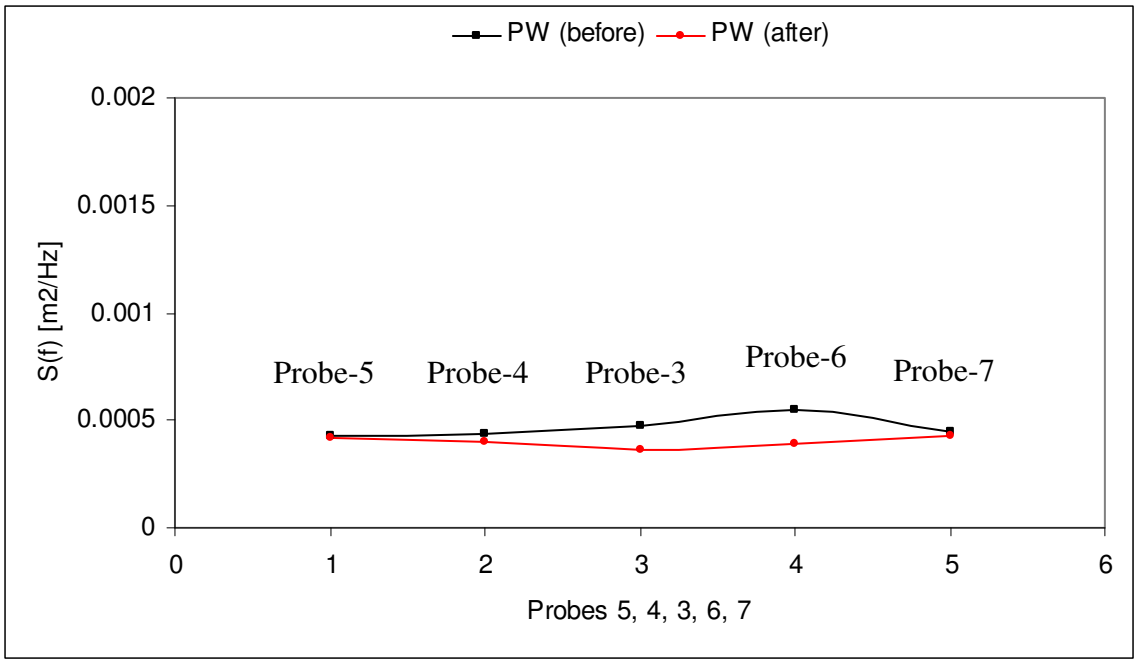

Fig. 43*c*: Cross-tank energy distribution for isolated principal waves
B4-2: BIP4_H0P06_T1P55_T1P45

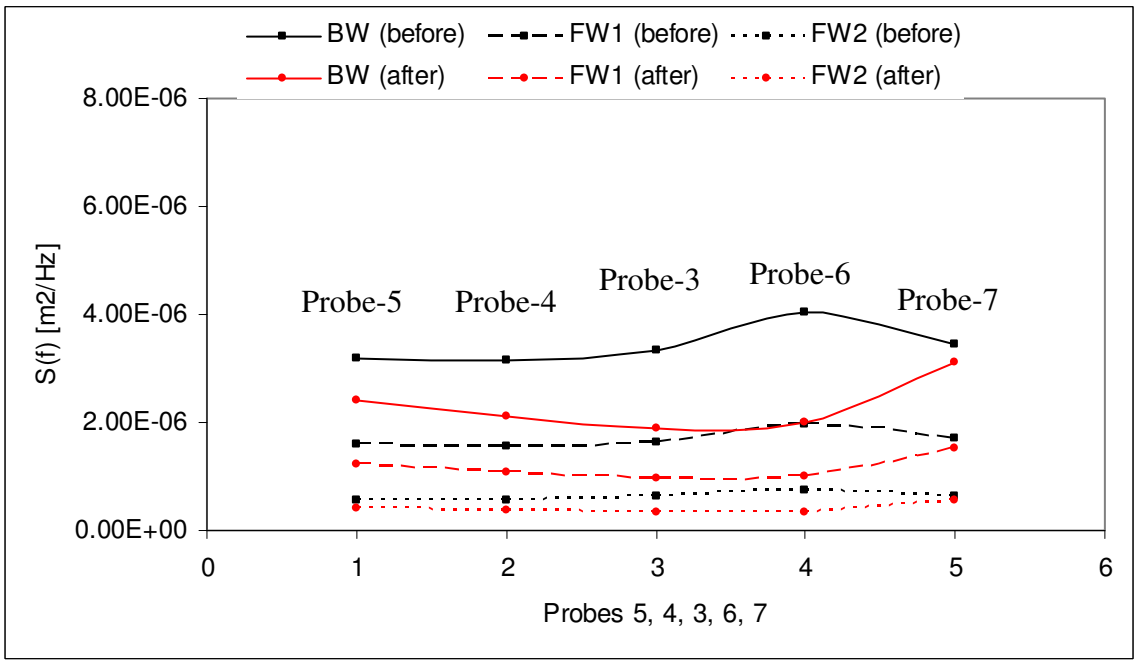

Fig. 43*d*: Cross-tank energy distribution for isolated second-order waves
B4-2: BIP4_H0P06_T1P55_T1P45

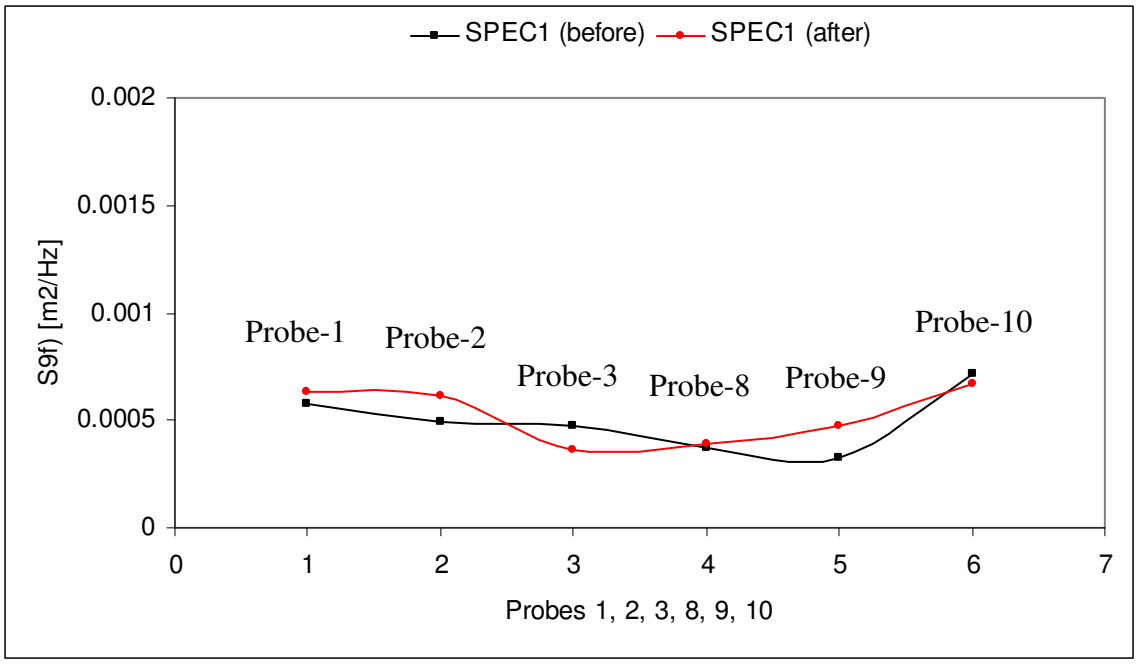

Fig. 43*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-2: BIP4_H0P06_T1P55_T1P45

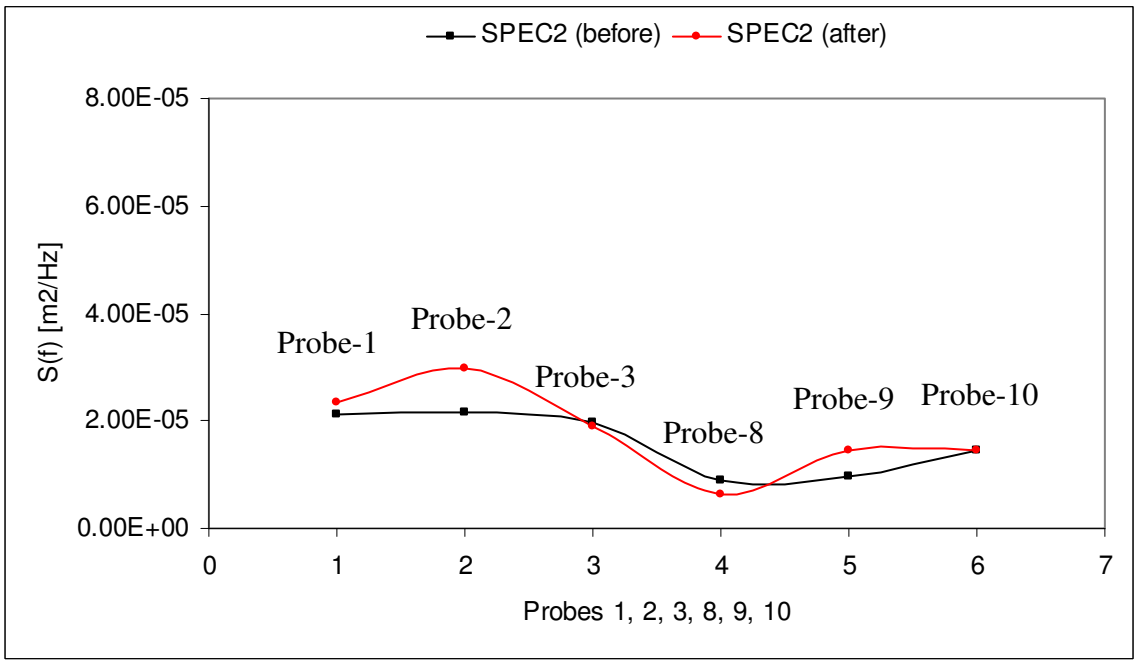

Fig. 43*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-2: BIP4_H0P06_T1P55_T1P45

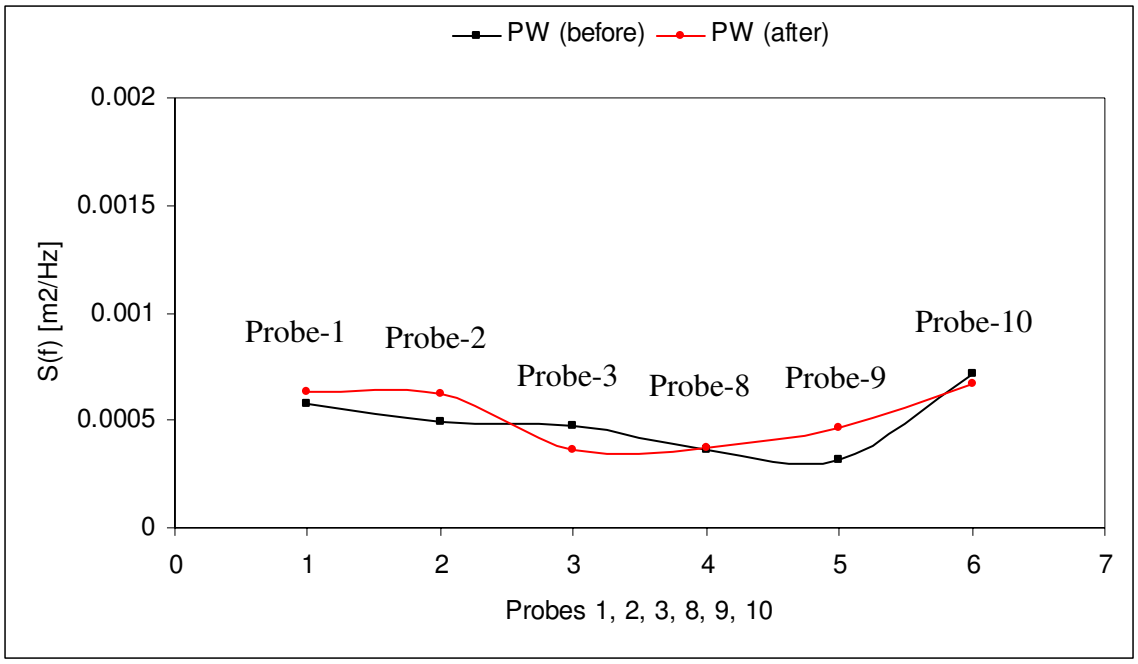

Fig. 43*g*: Along-tank energy distribution for isolated principal waves
B4-2: BIP4_H0P06_T1P55_T1P45

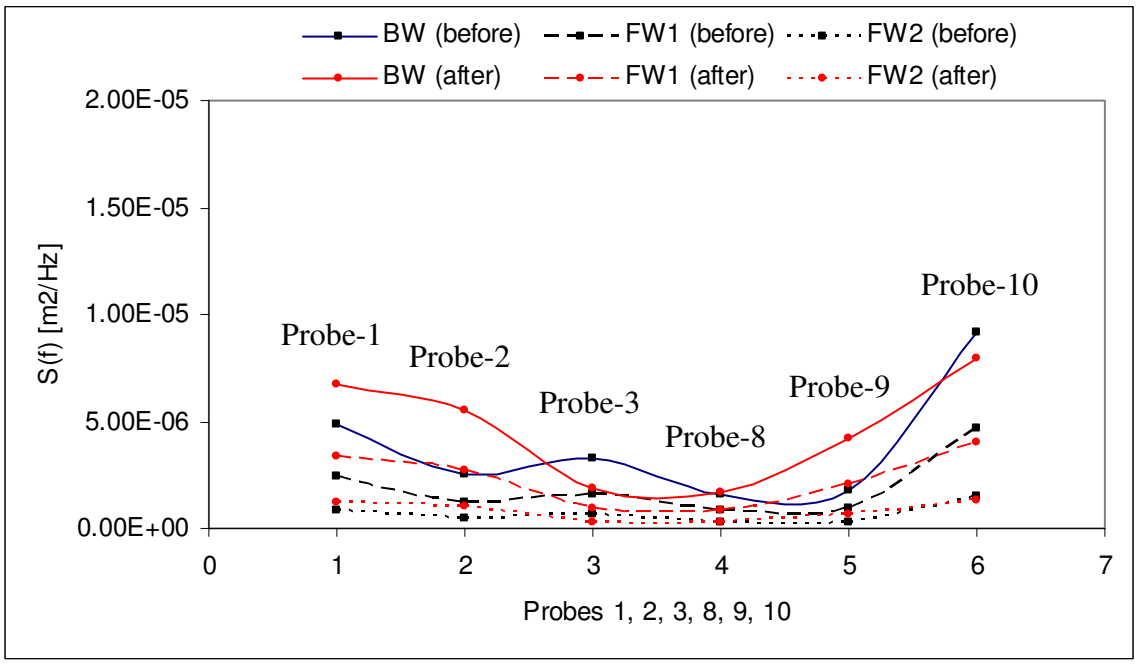

Fig. 43*h*: Along-tank energy distribution for isolated second-order waves
B4-2: BIP4_H0P06_T1P55_T1P45

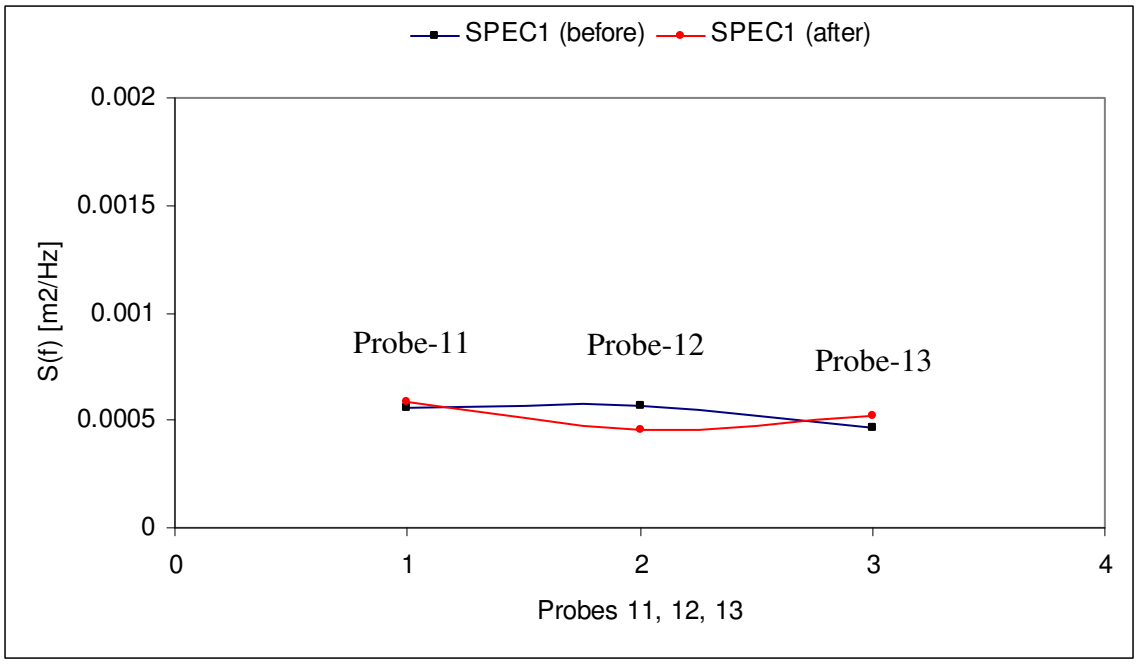

Fig. 43*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-2: BIP4_H0P06_T1P55_T1P45

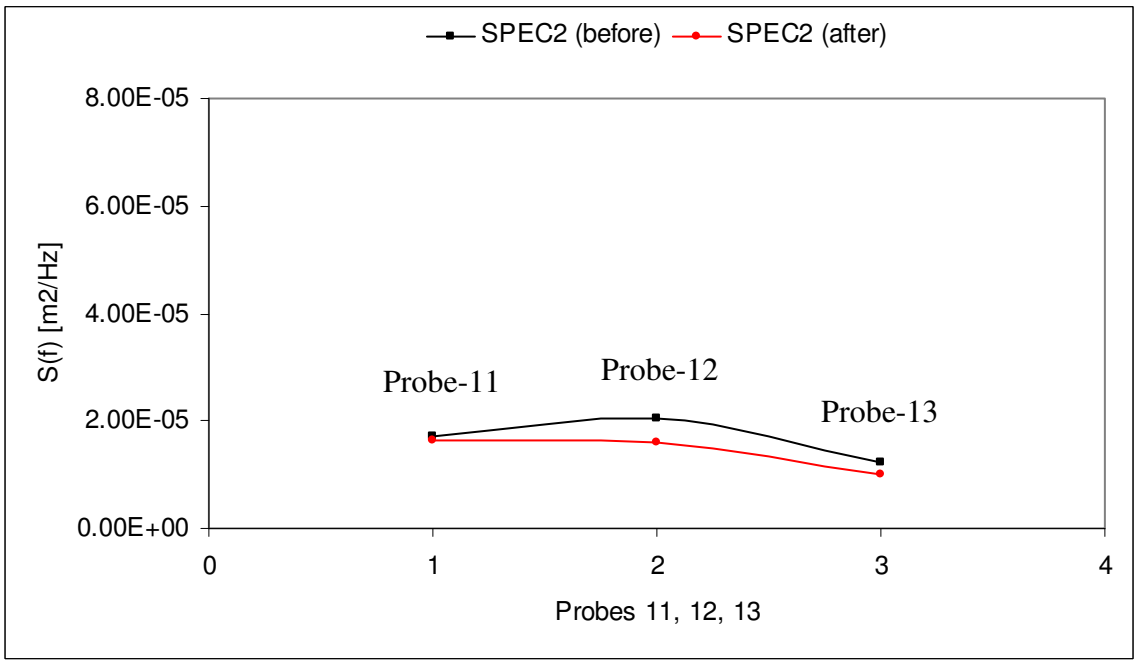

Fig. 43*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-2: BIP4_H0P06_T1P55_T1P45

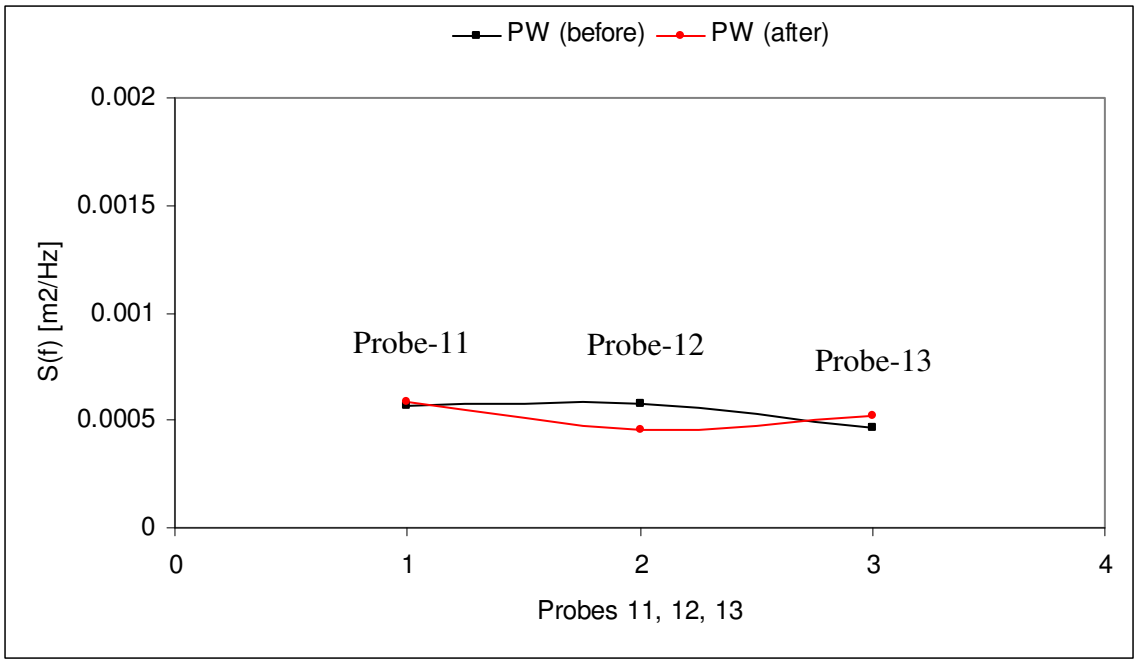

Fig. 43*k*: Cross-tank energy distribution for isolated principal waves
B4-2: BIP4_H0P06_T1P55_T1P45

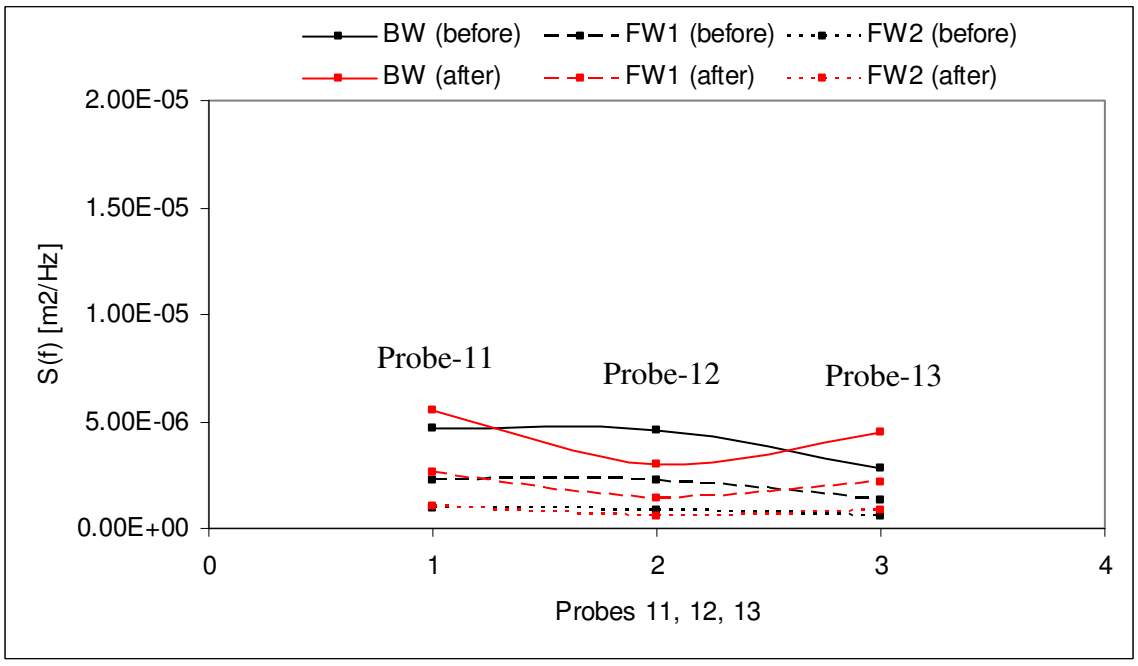

Fig. 43*l*: Cross-tank energy distribution for isolated second-order waves
B4-2: BIP4_H0P06_T1P55_T1P45

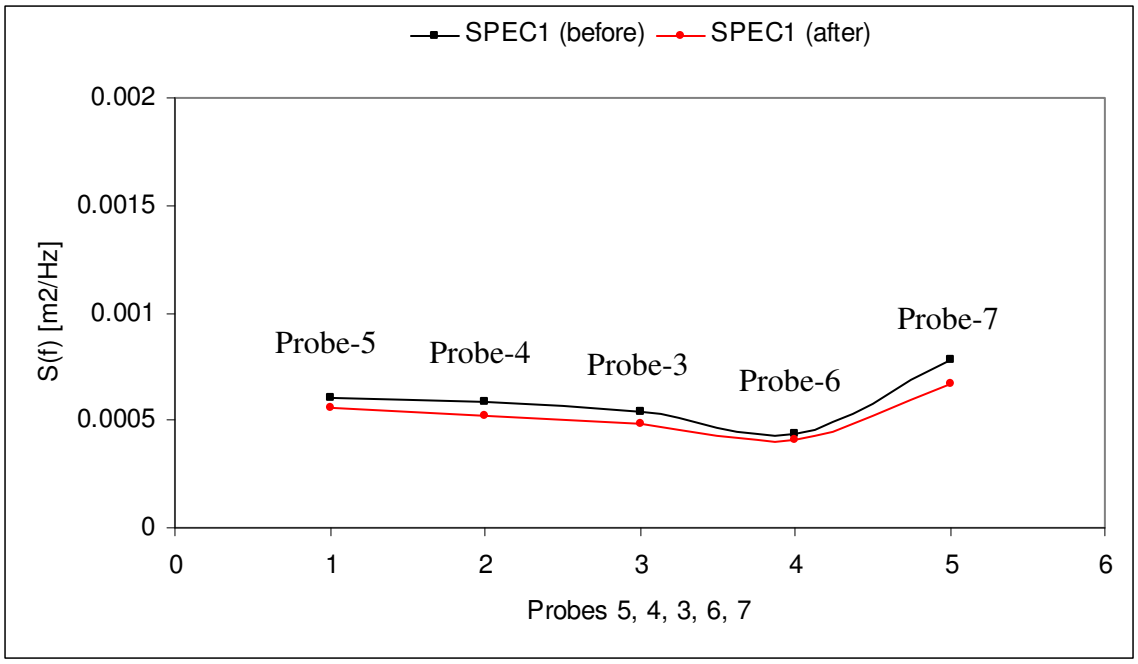

Fig. 44*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-3: BIP4_H0P06_T2P22_T2P0

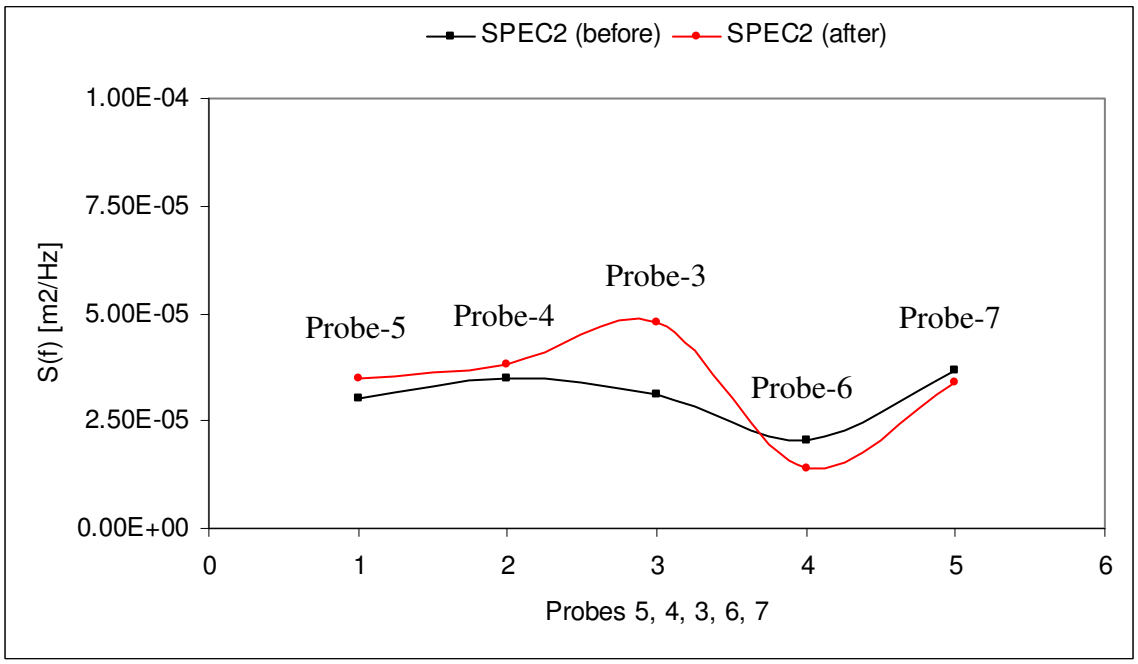

Fig. 44*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-3: BIP4_H0P06_T2P22_T2P0

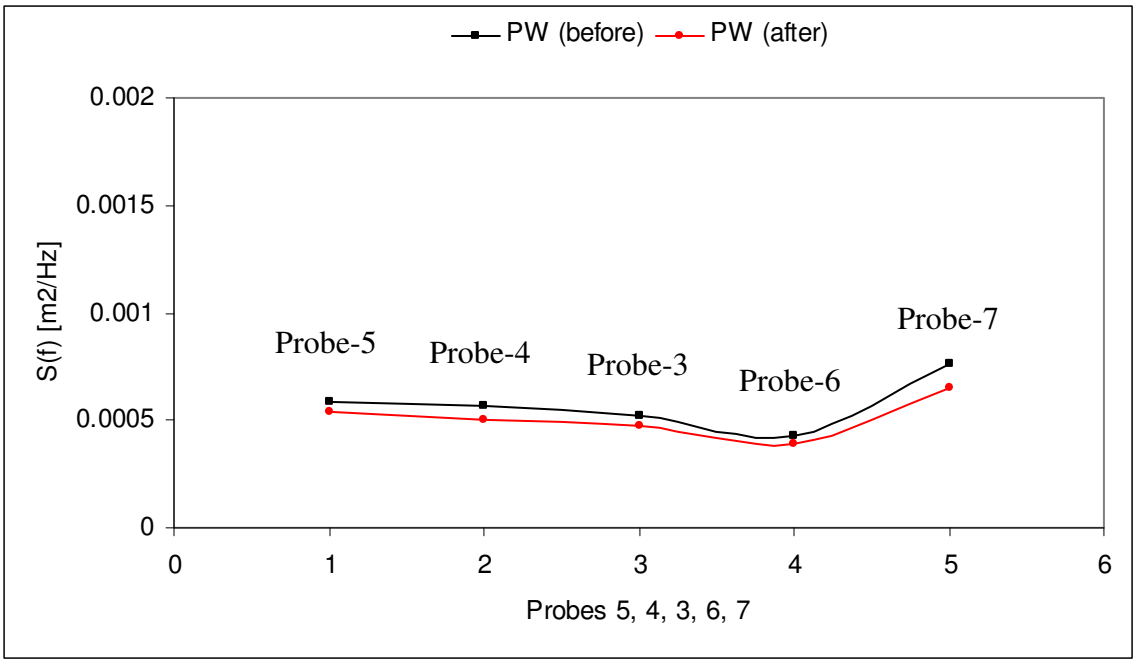

Fig. 44*c*: Cross-tank energy distribution for isolated principal waves
B4-3: BIP4_H0P06_T2P22_T2P0

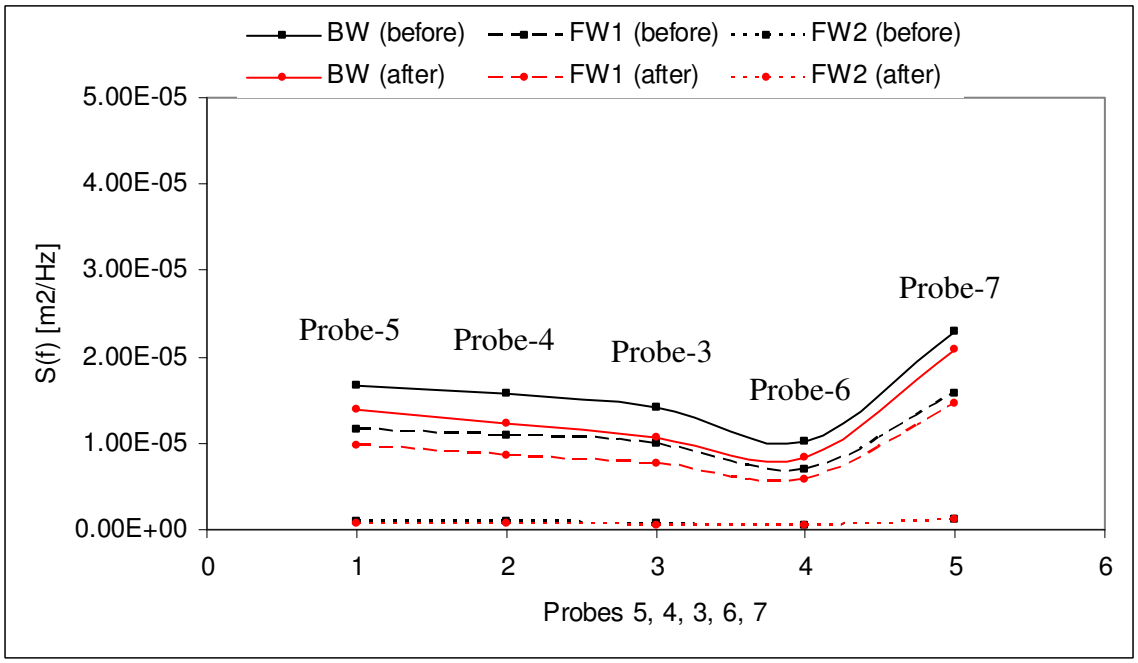

Fig. 44*d*: Cross-tank energy distribution for isolated second-order waves
B4-3: BIP4_H0P06_T2P22_T2P0

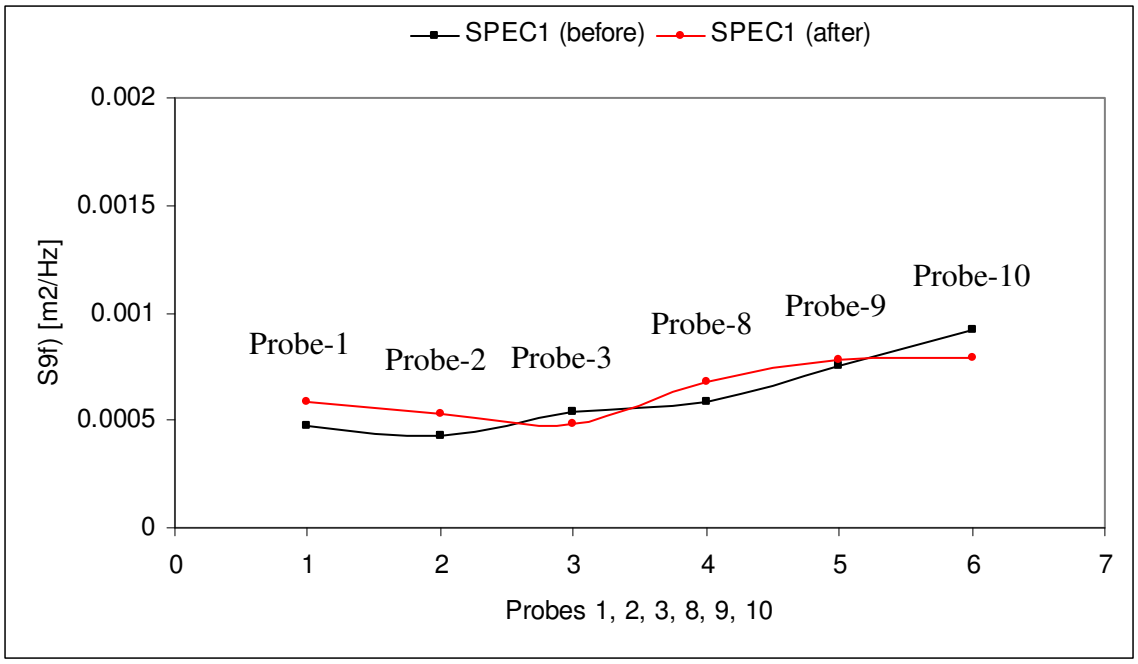

Fig. 44*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-3: BIP4_H0P06_T2P22_T2P0

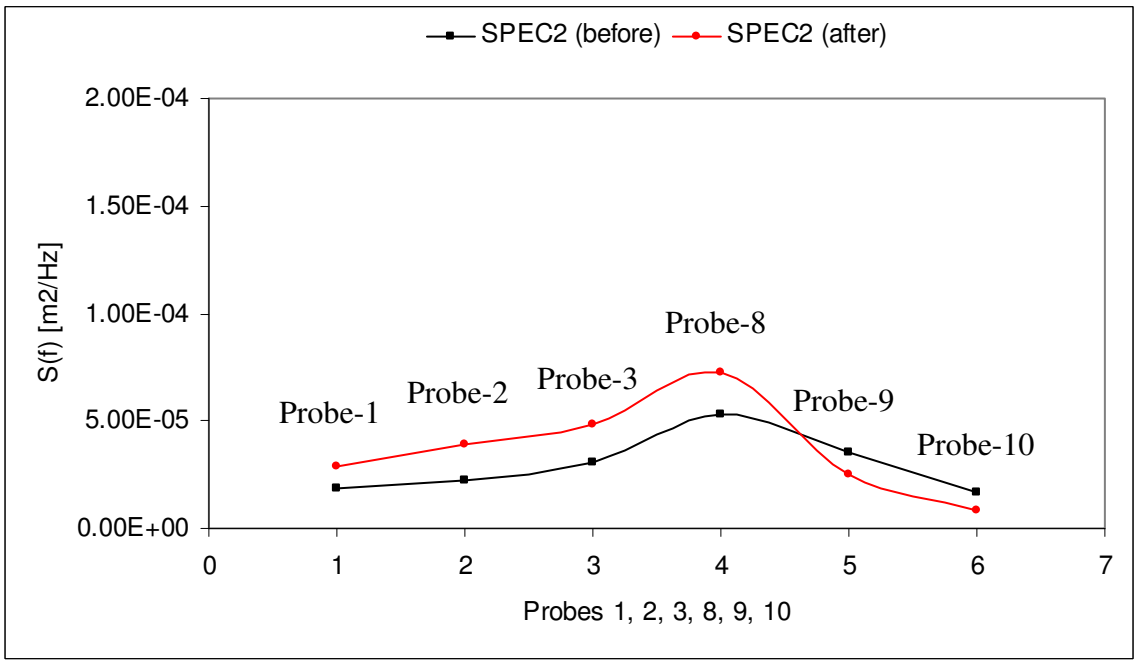

Fig. 44*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-3: BIP4_H0P06_T2P22_T2P0

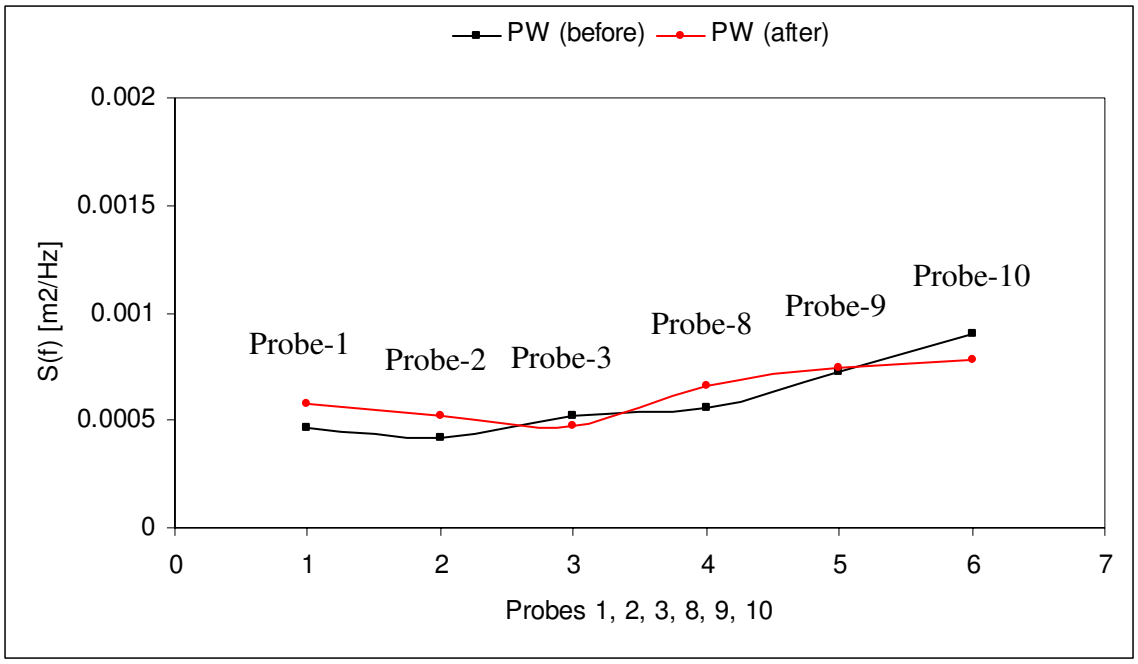

Fig. 44*g*: Along-tank energy distribution for isolated principal waves
B4-3: BIP4_H0P06_T2P22_T2P0

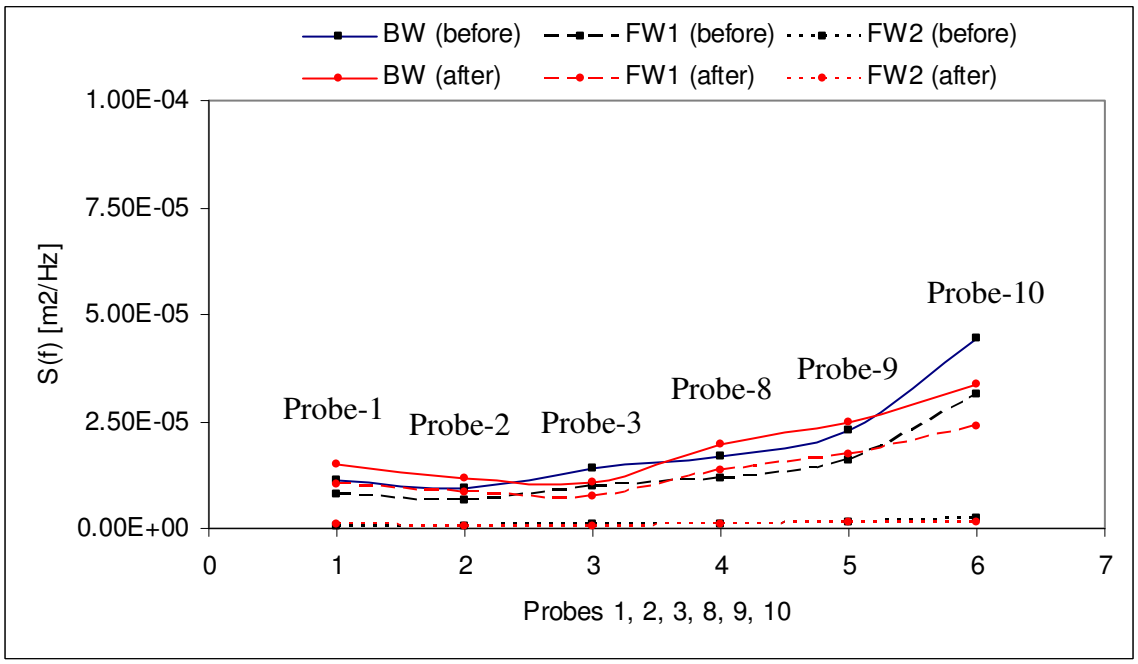

Fig. 44*h*: Along-tank energy distribution for isolated second-order waves
B4-3: BIP4_H0P06_T2P22_T2P0

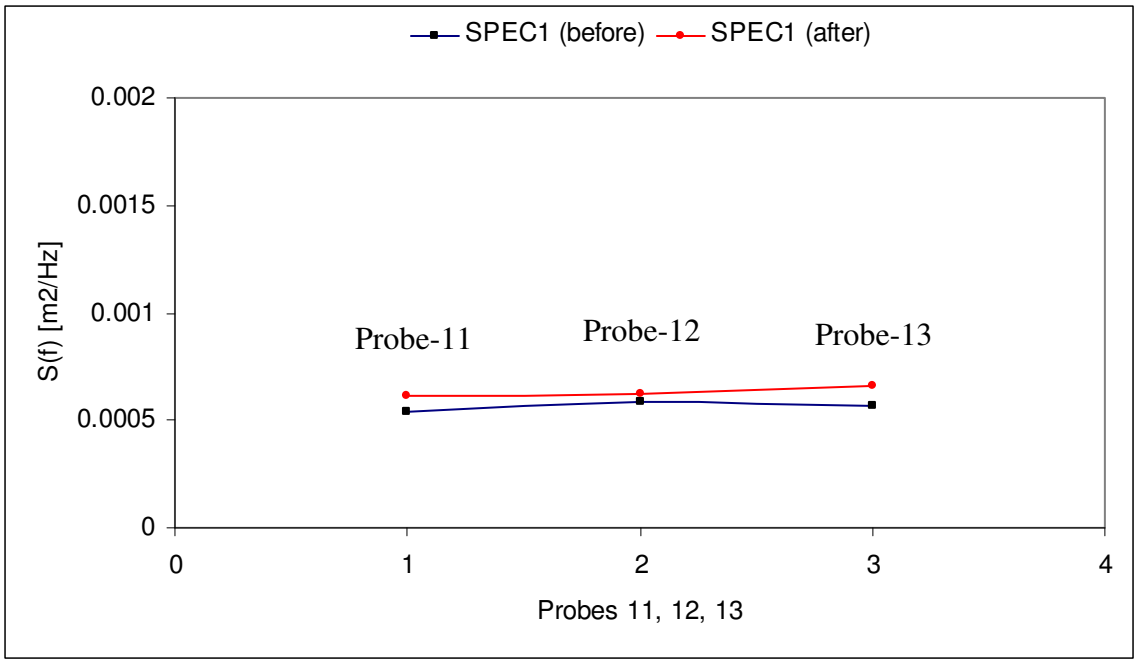

Fig. 44*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B4-3: BIP4_H0P06_T2P22_T2P0

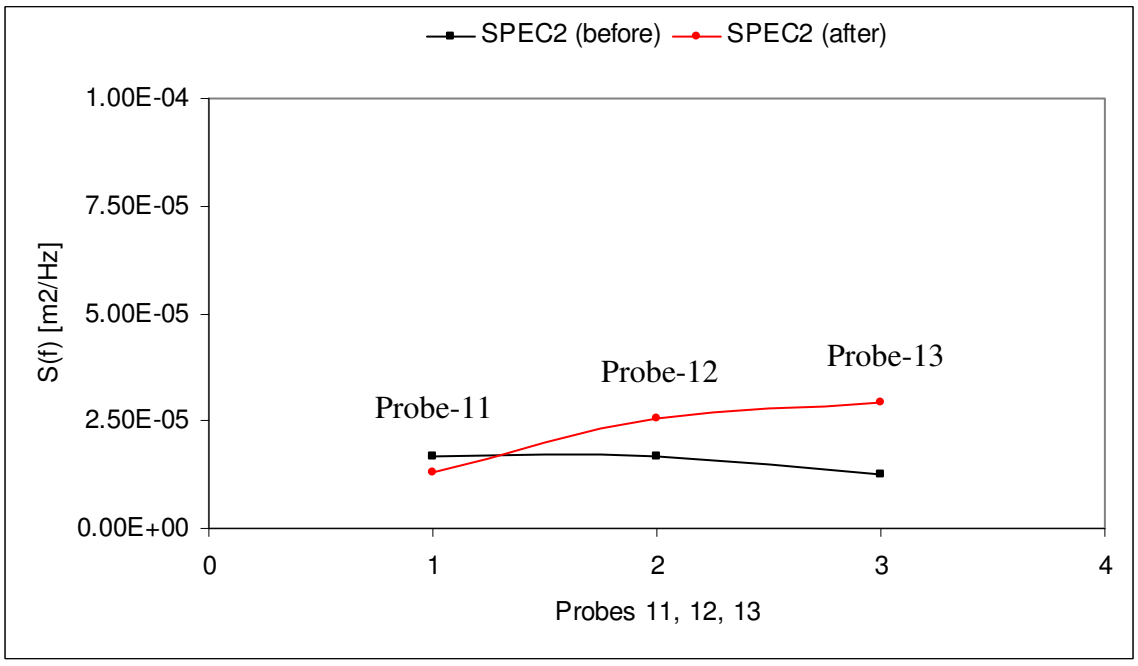

Fig. 44*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B4-3: BIP4_H0P06_T2P22_T2P0

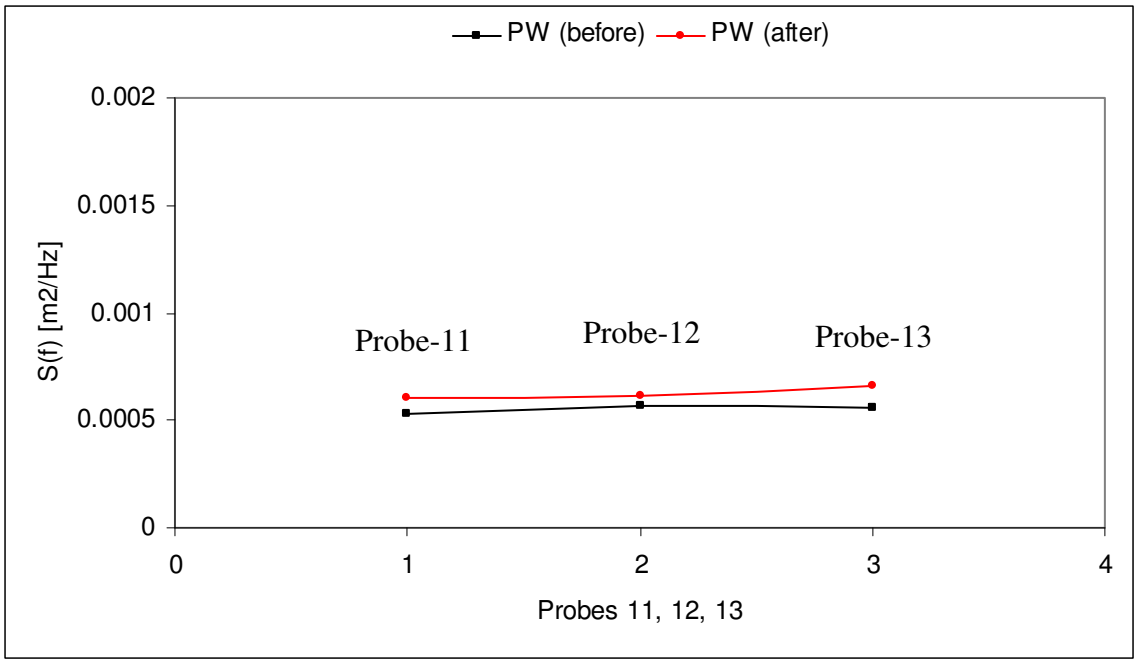

Fig. 44*k*: Cross-tank energy distribution for isolated principal waves
B4-3: BIP4_H0P06_T2P22_T2P0

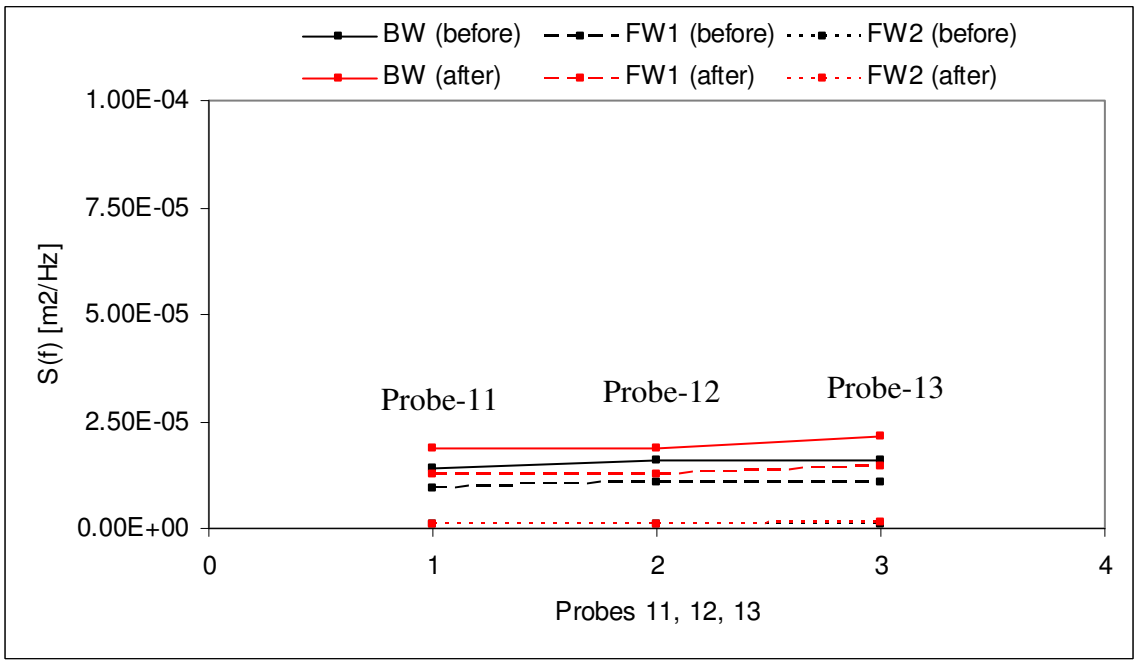

Fig. 44*l*: Cross-tank energy distribution for isolated second-order waves
B4-3: BIP4_H0P06_T2P22_T2P0

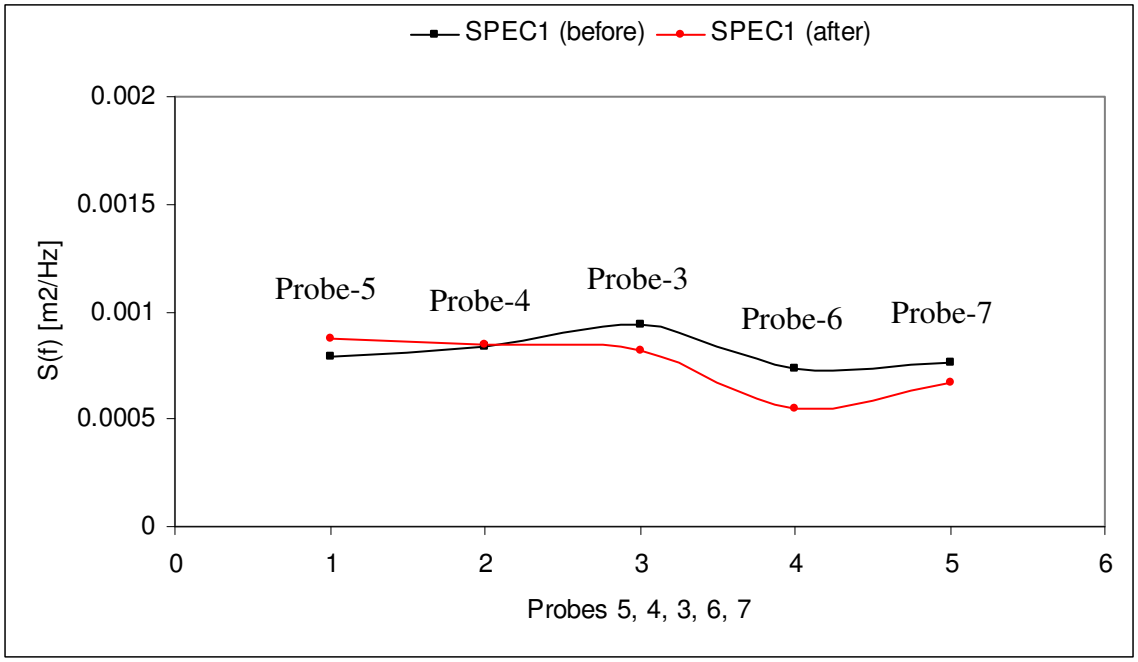

Fig. 45*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-1: BIP5_H0P06_T1P25_T1P17

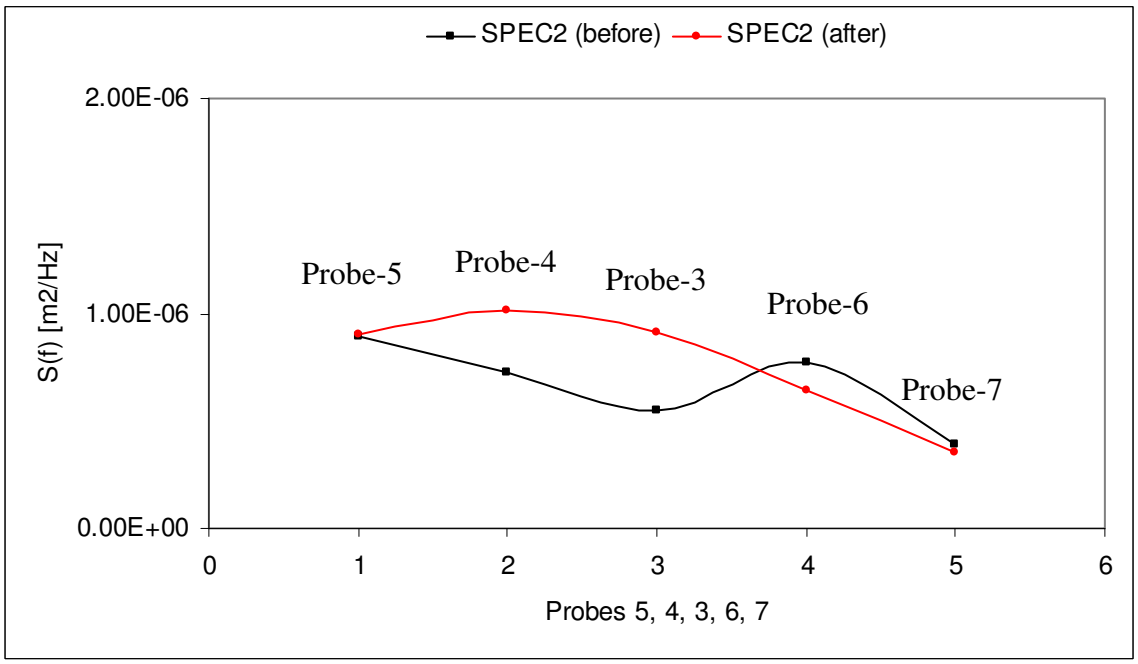

Fig. 45*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-1: BIP5_H0P06_T1P25_T1P17

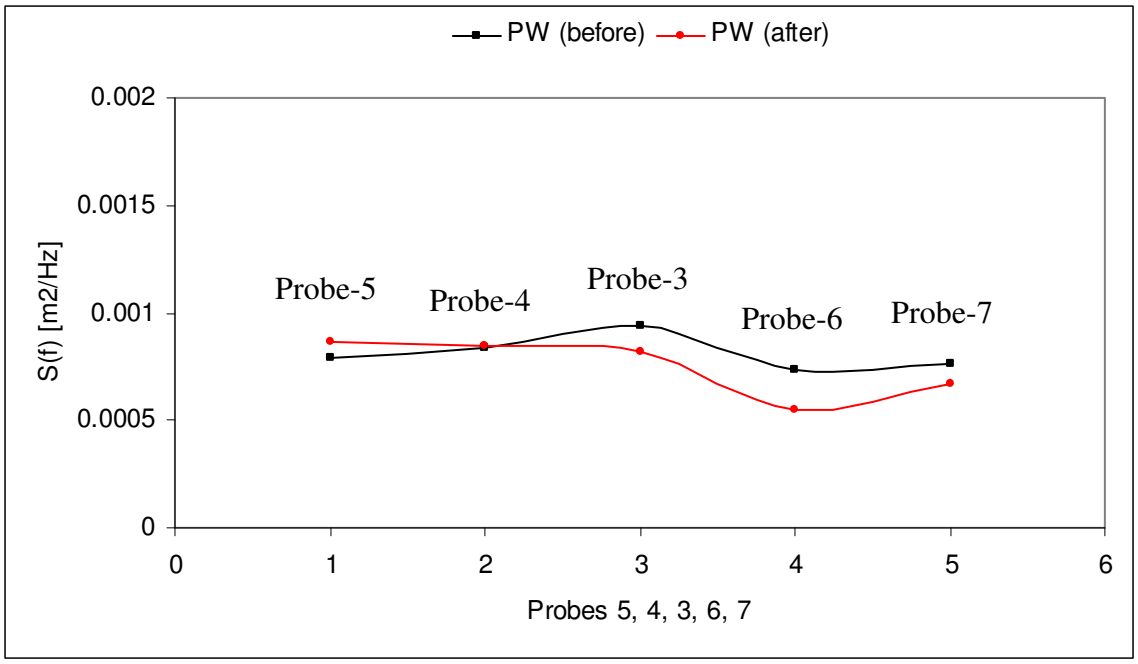

Fig. 45*c*: Cross-tank energy distribution for isolated principal waves
B5-1: BIP5_H0P06_T1P25_T1P17

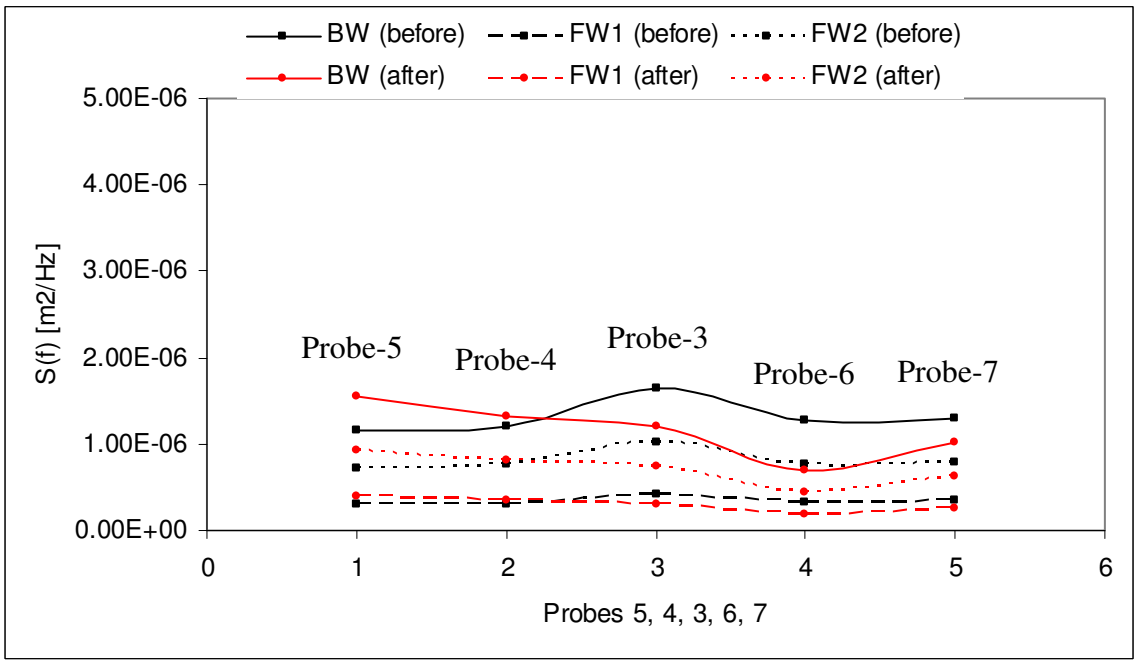

Fig. 45*d*: Cross-tank energy distribution for isolated second-order waves
B5-1: BIP5_H0P06_T1P25_T1P17

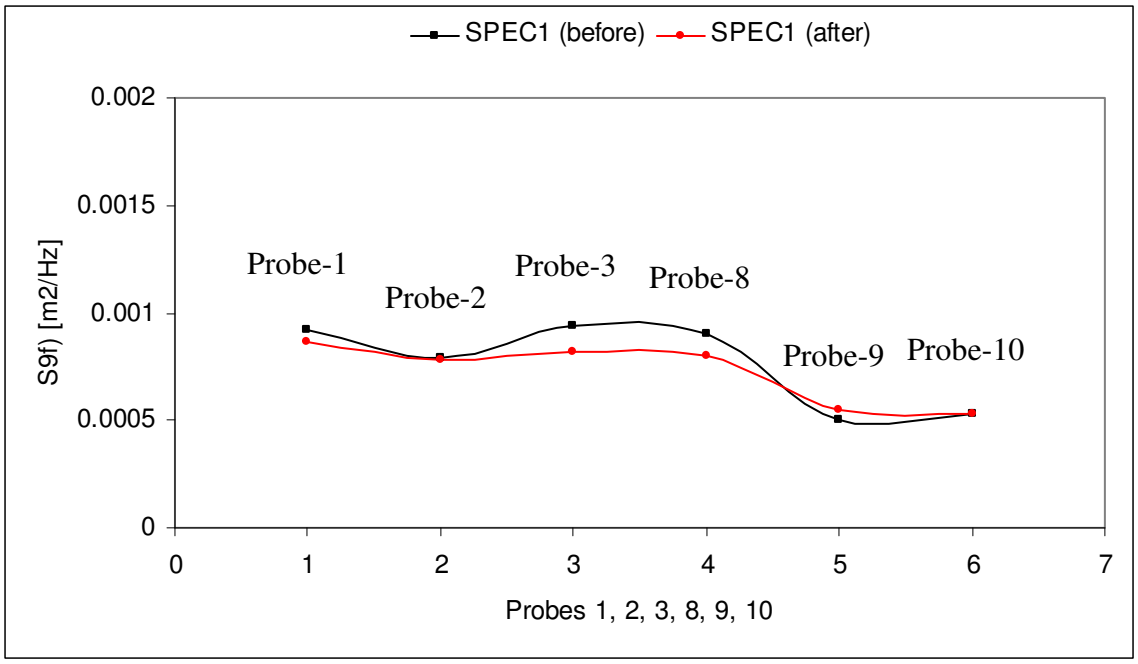

Fig. 45*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-1: BIP5_H0P06_T1P25_T1P17

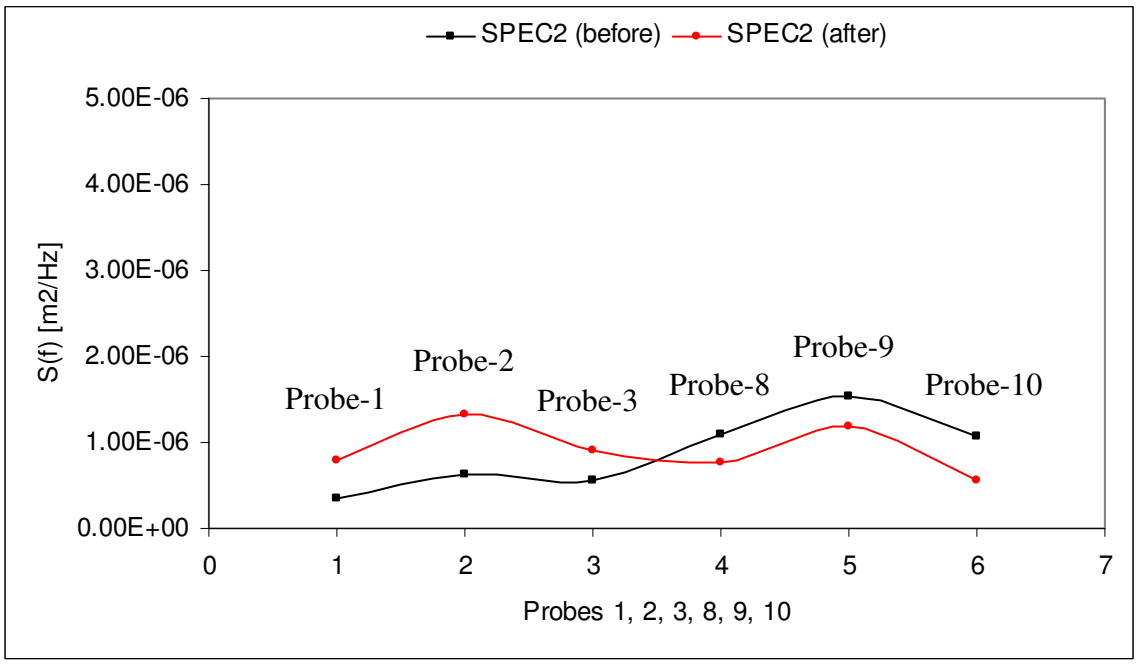

Fig. 45*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-1: BIP5_H0P06_T1P25_T1P17

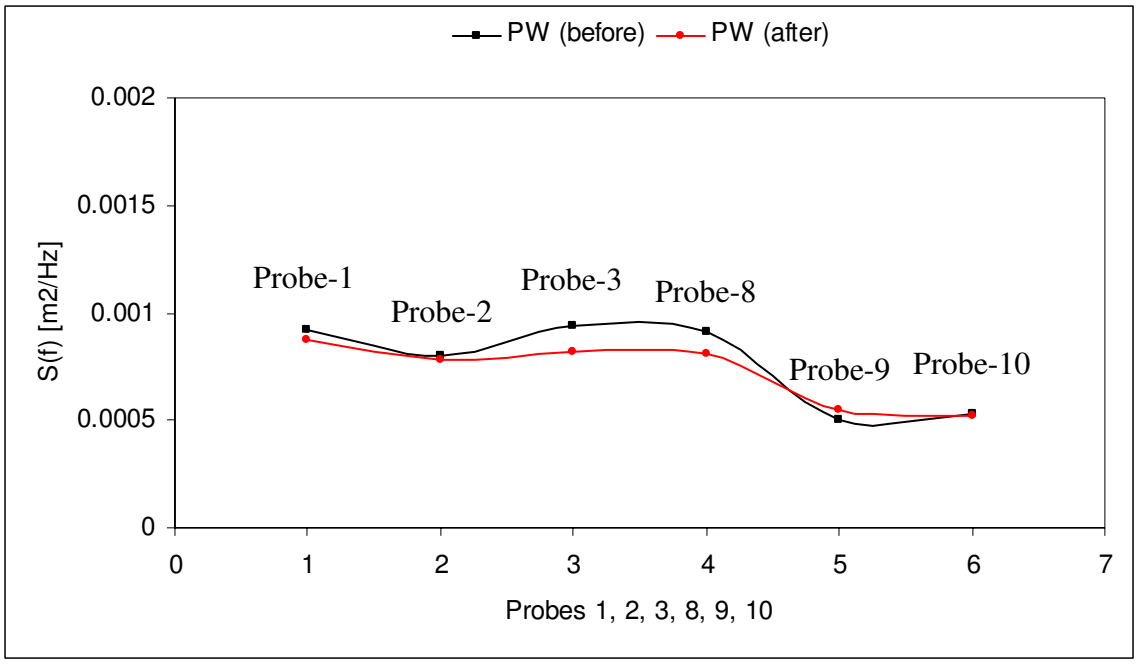

Fig. 45*g*: Along-tank energy distribution for isolated principal waves
B5-1: BIP5_H0P06_T1P25_T1P17

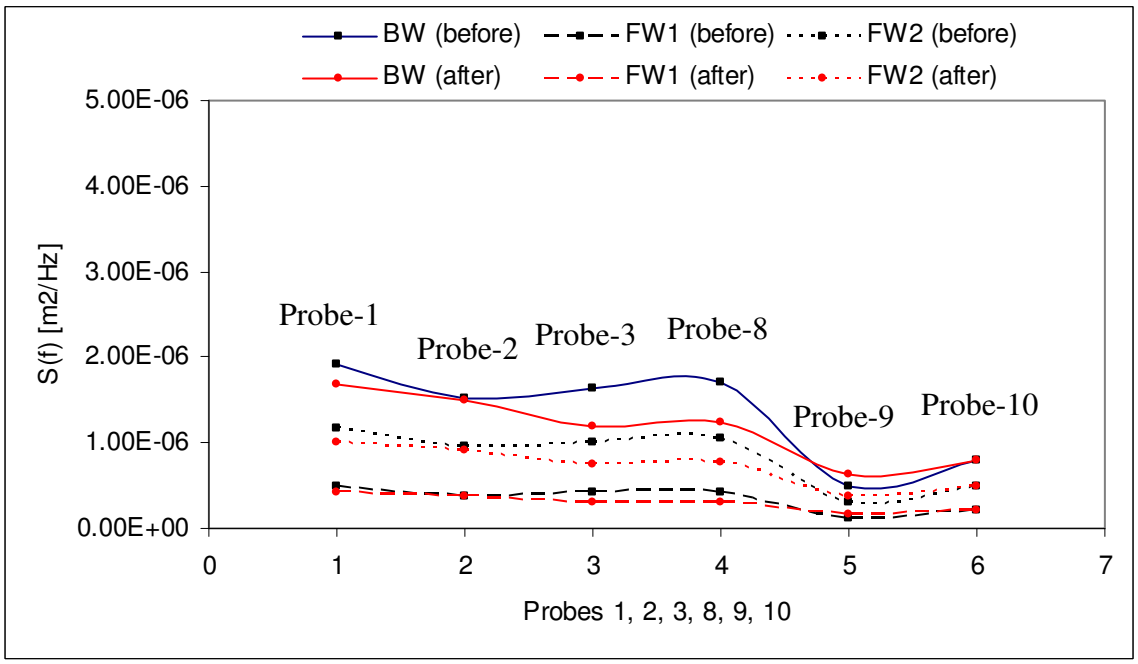

Fig. 45*h*: Along-tank energy distribution for isolated second-order waves
B5-1: BIP5_H0P06_T1P25_T1P17

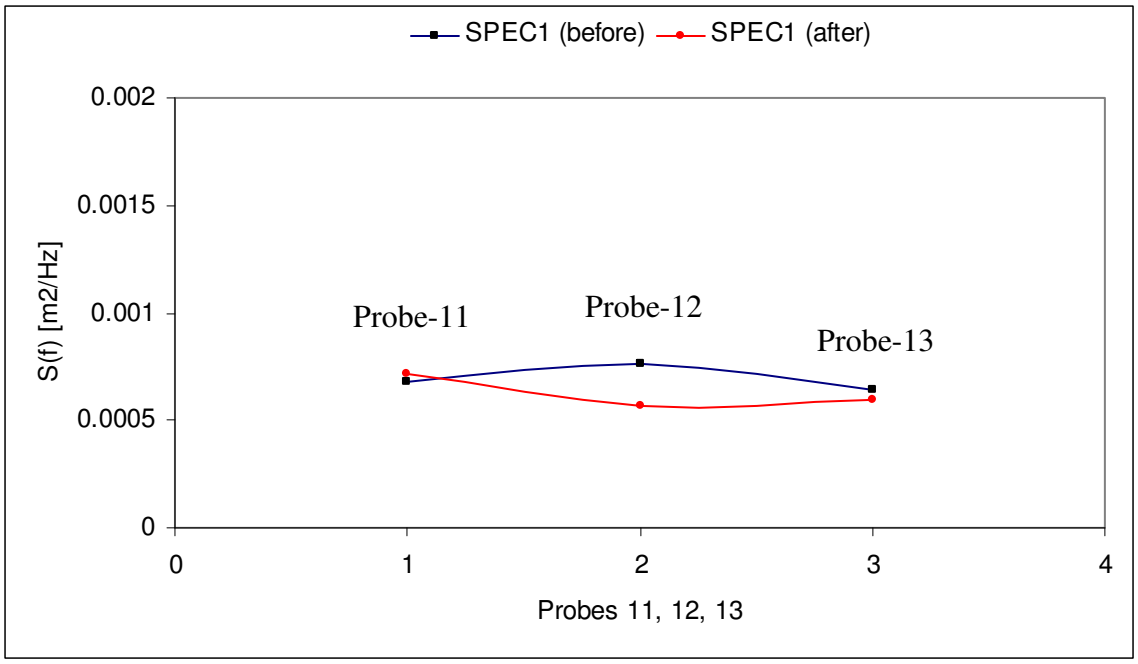

Fig. 45*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-1: BIP5_H0P06_T1P25_T1P17

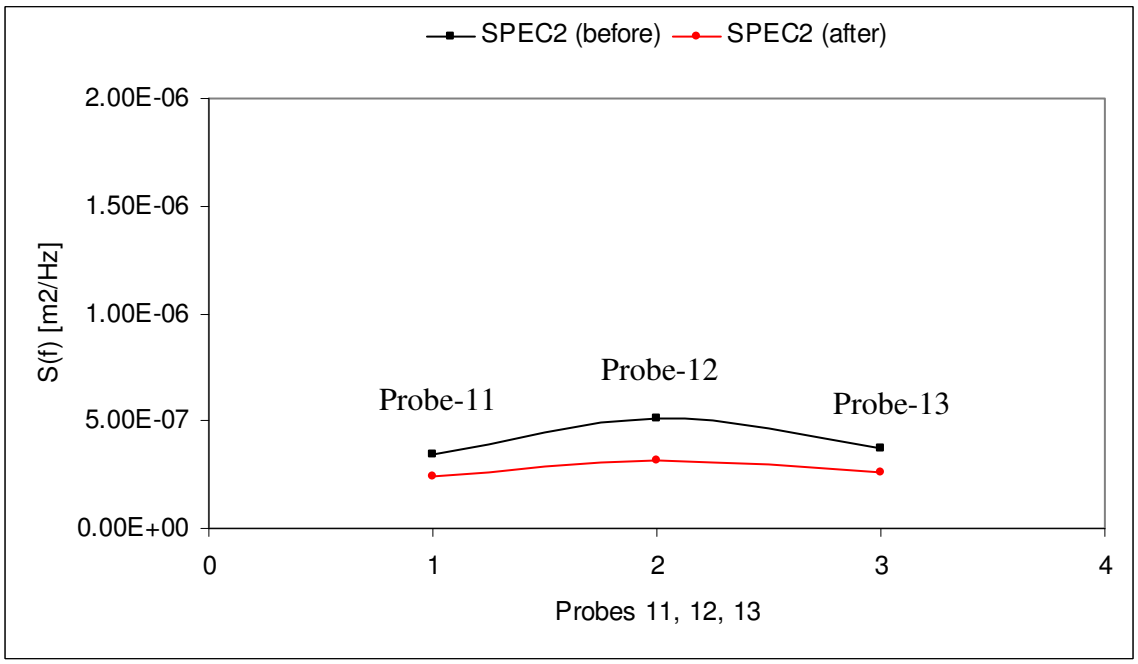

Fig. 45*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-1: BIP5_H0P06_T1P25_T1P17

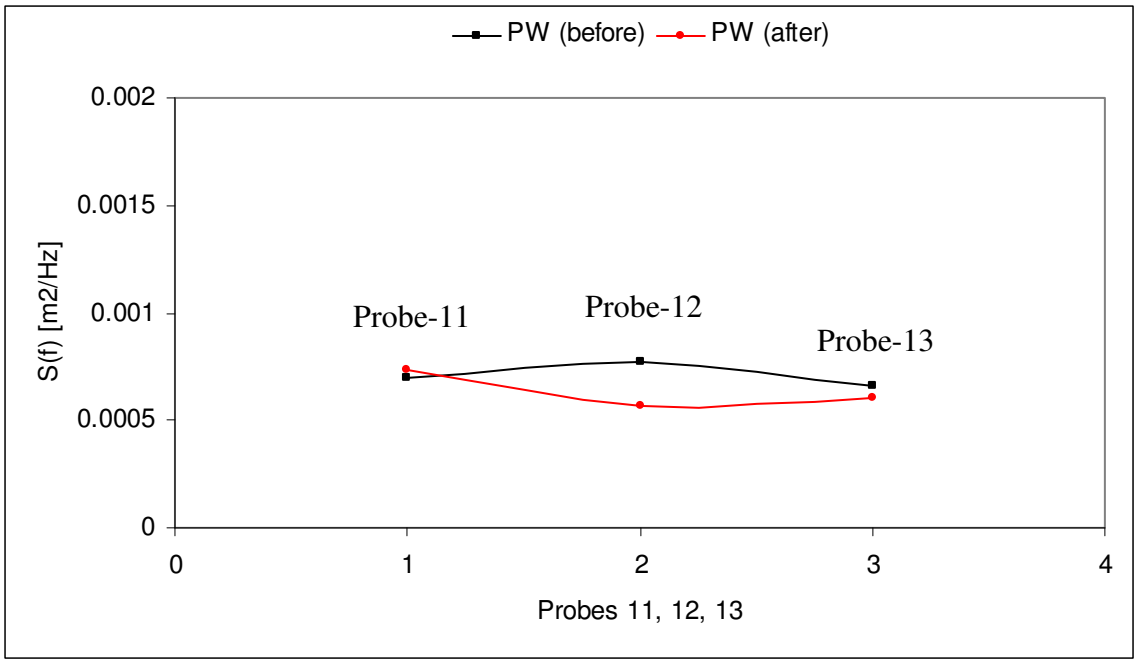

Fig. 45*k*: Cross-tank energy distribution for isolated principal waves
B5-1: BIP5_H0P06_T1P25_T1P17

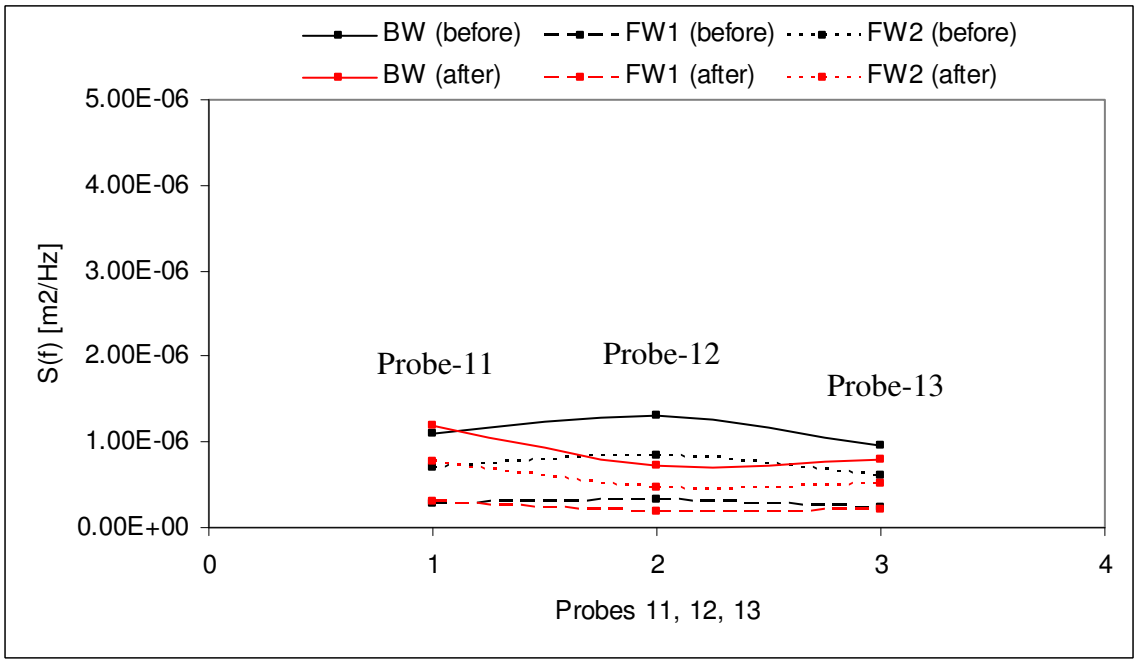

Fig. 45*l*: Cross-tank energy distribution for isolated second-order waves
B5-1: BIP5_H0P06_T1P25_T1P17

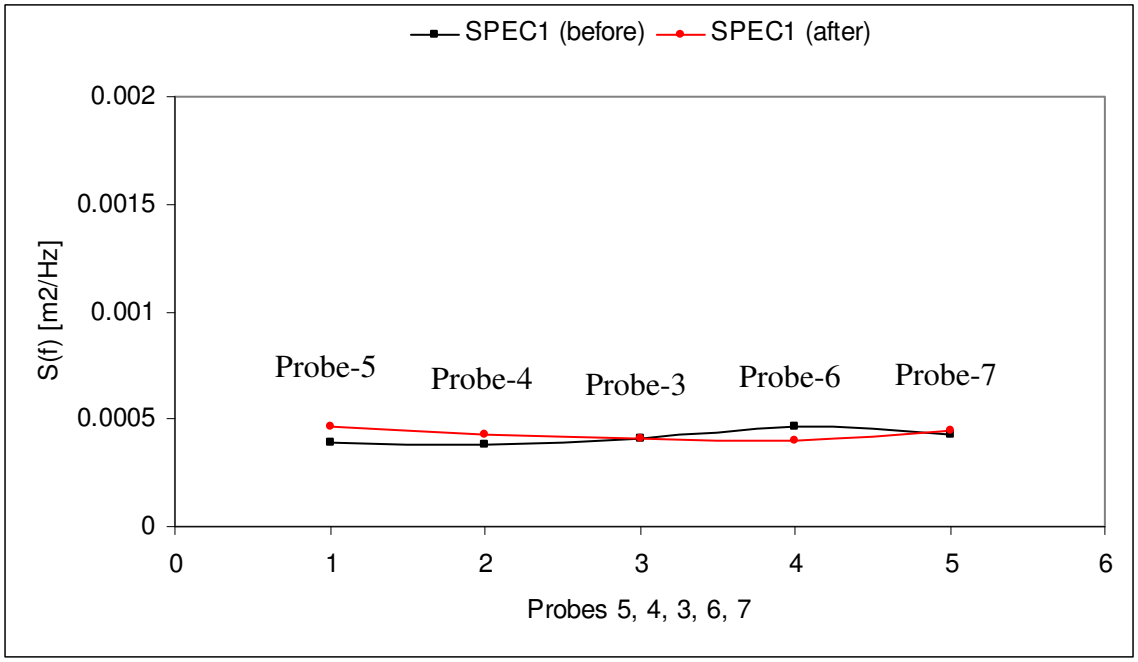

Fig. 46*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-2: BIP5_H0P06_T1P55_T1P45

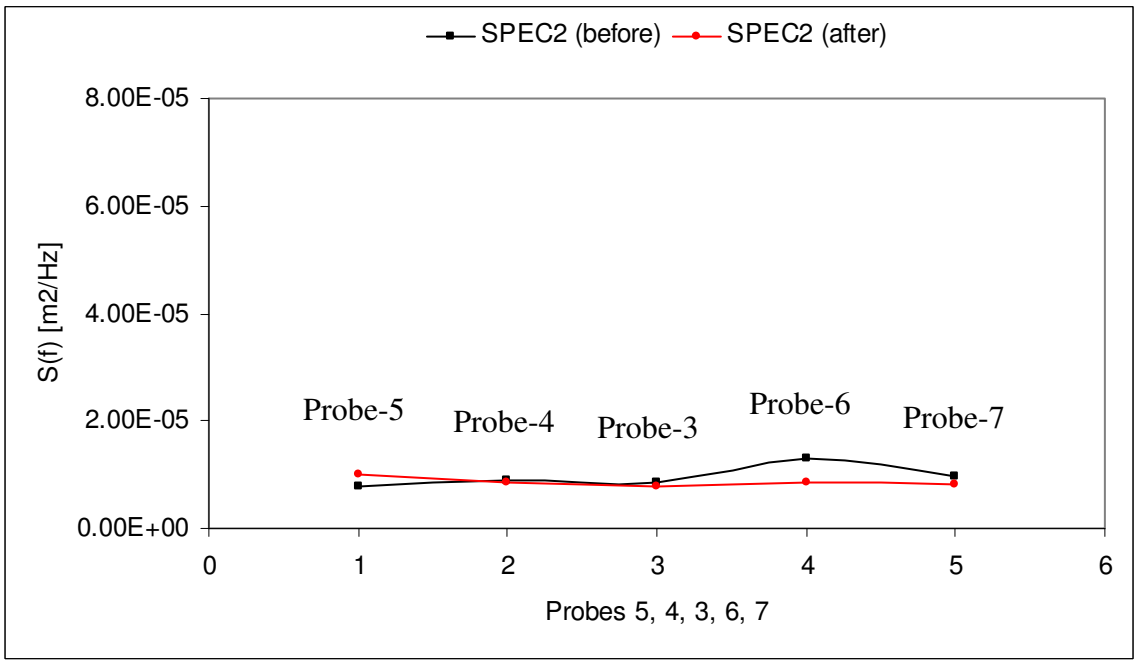

Fig. 46*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-2: BIP5_H0P06_T1P55_T1P45

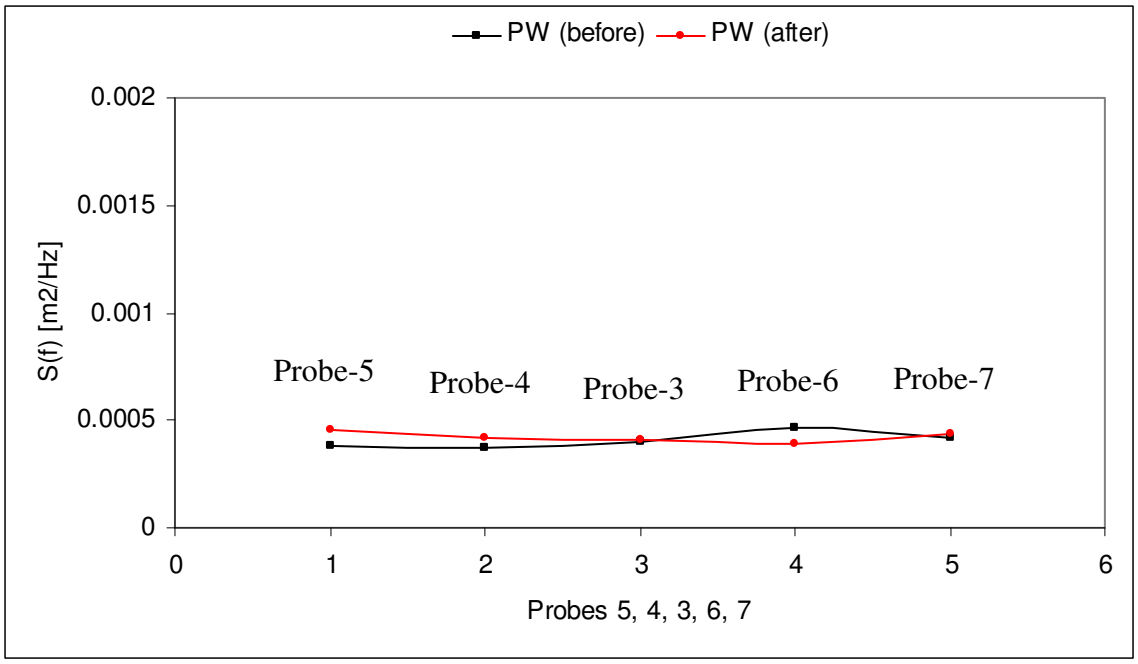

Fig. 46*c*: Cross-tank energy distribution for isolated principal waves
B5-2: BIP5_H0P06_T1P55_T1P45

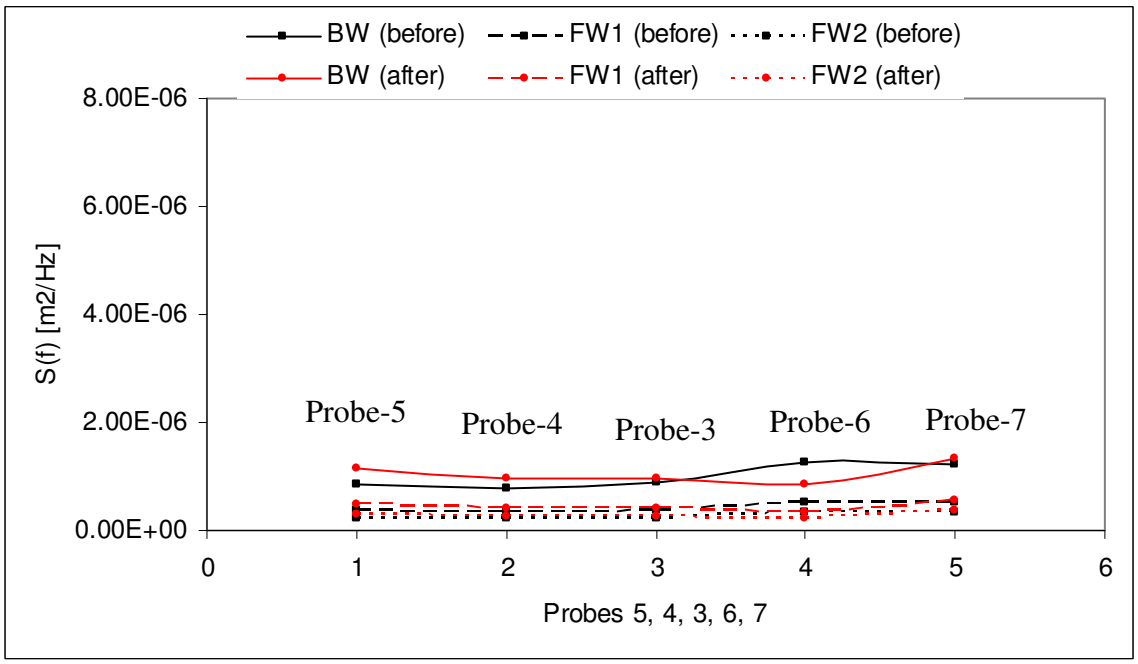

Fig. 46*d*: Cross-tank energy distribution for isolated second-order waves
B5-2: BIP5_H0P06_T1P55_T1P45

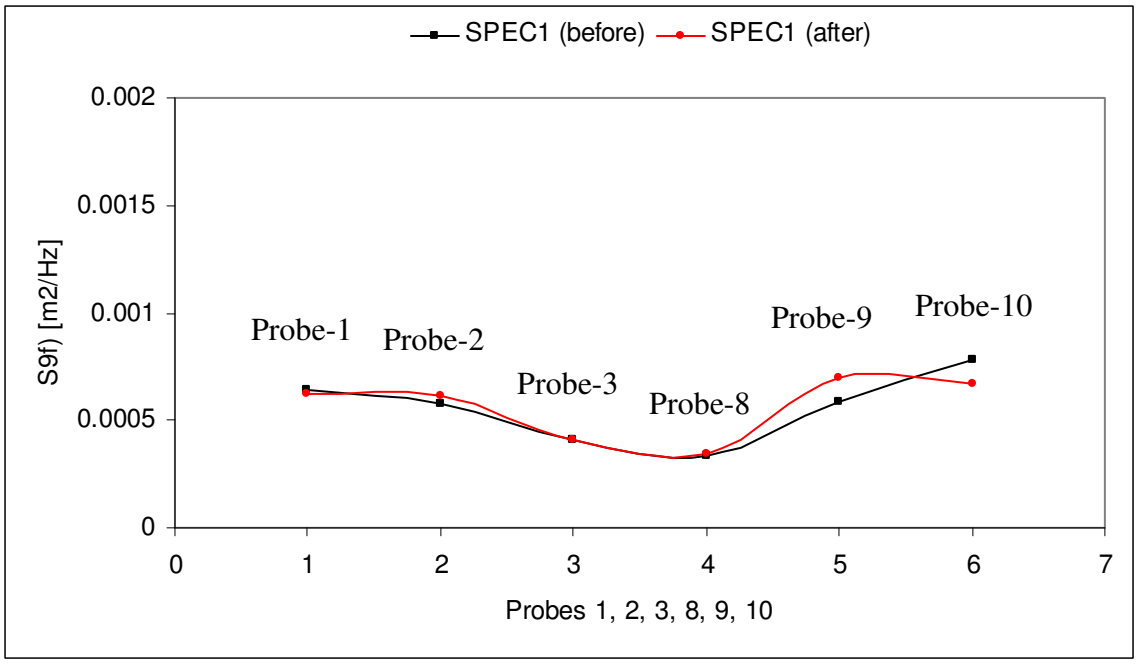

Fig. 46*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-2: BIP5_H0P06_T1P55_T1P45

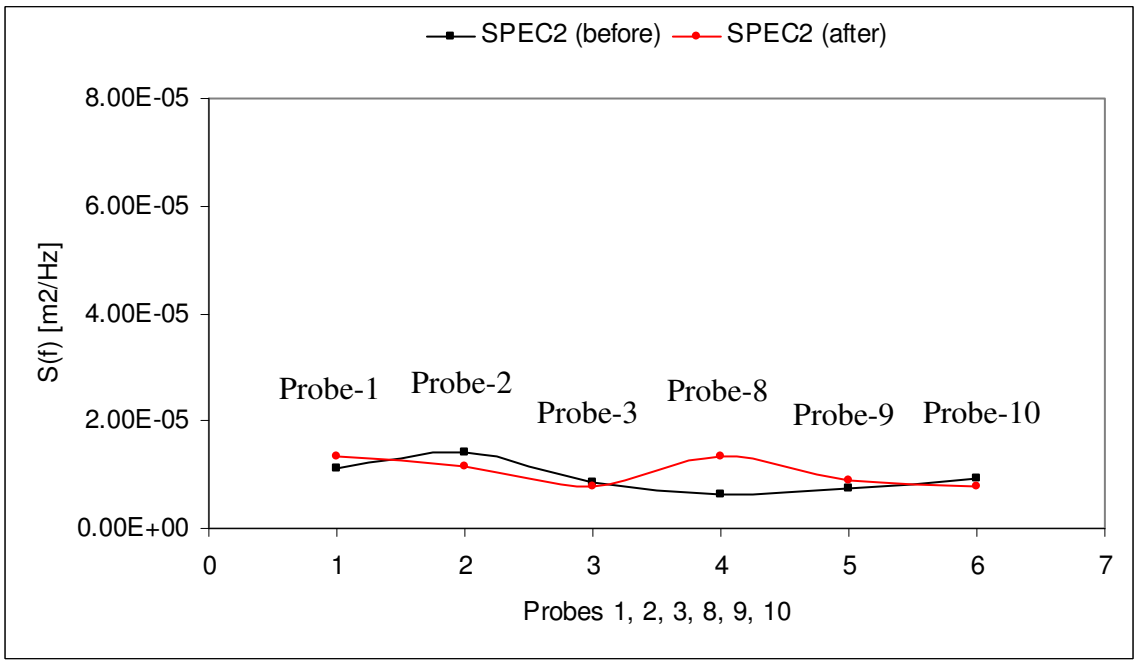

Fig. 46*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-2: BIP5_H0P06_T1P55_T1P45

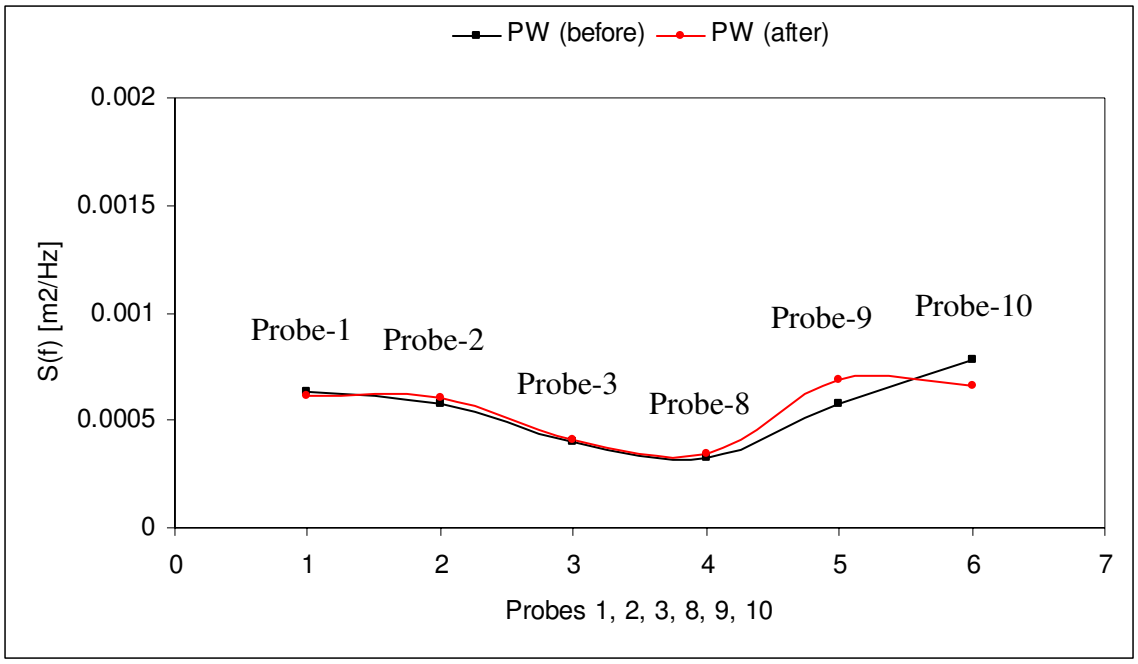

Fig. 46*g*: Along-tank energy distribution for isolated principal waves
B5-2: BIP5_H0P06_T1P55_T1P45

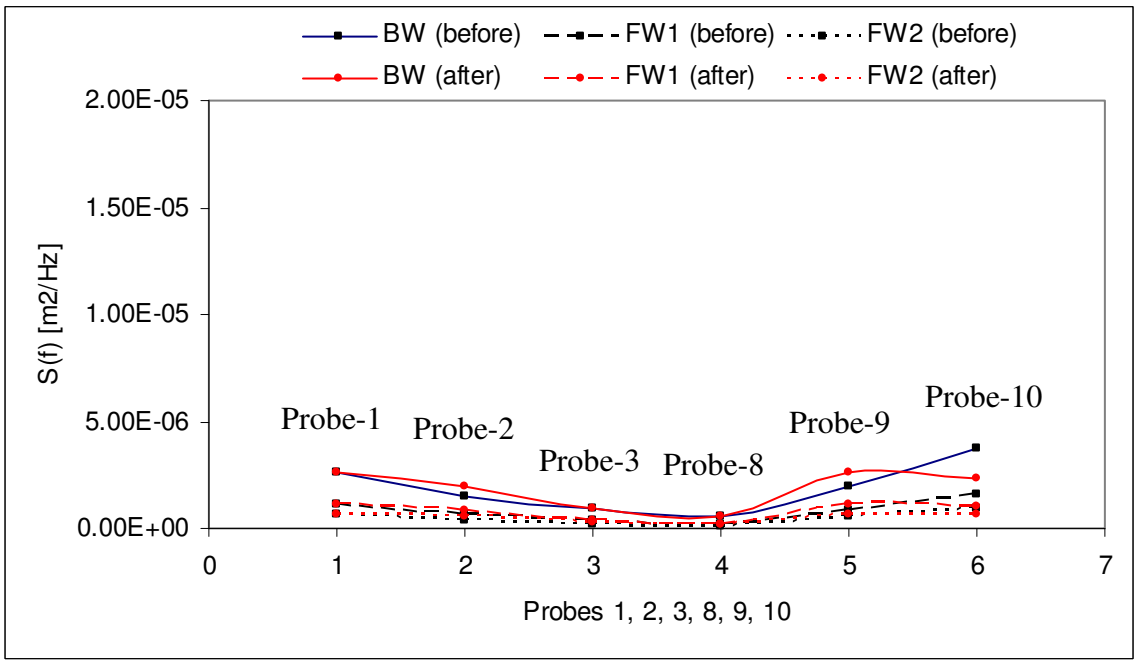

Fig. 46*h*: Along-tank energy distribution for isolated second-order waves
B5-2: BIP5_H0P06_T1P55_T1P45

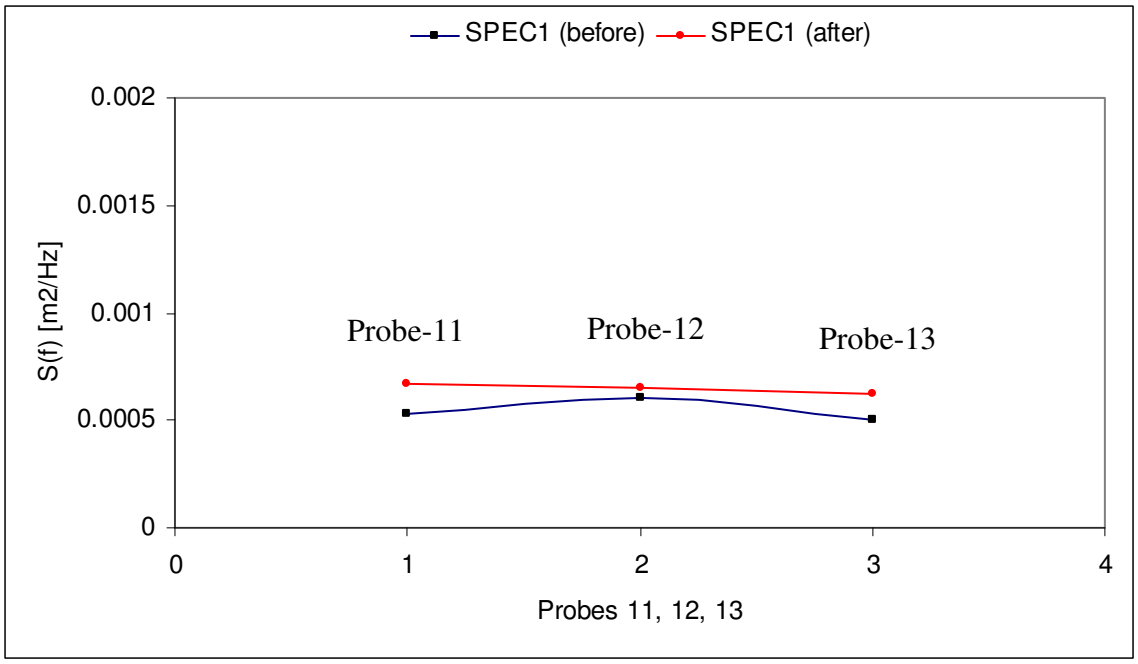

Fig. 46*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-2: BIP5_H0P06_T1P55_T1P45

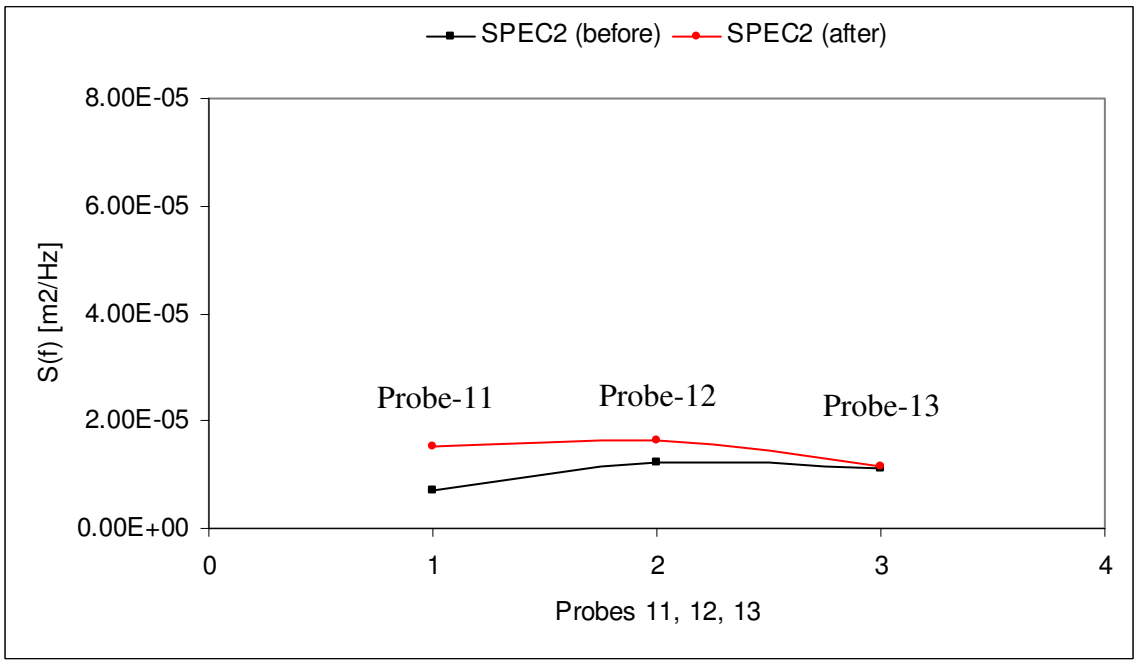

Fig. 46*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-2: BIP5_H0P06_T1P55_T1P45

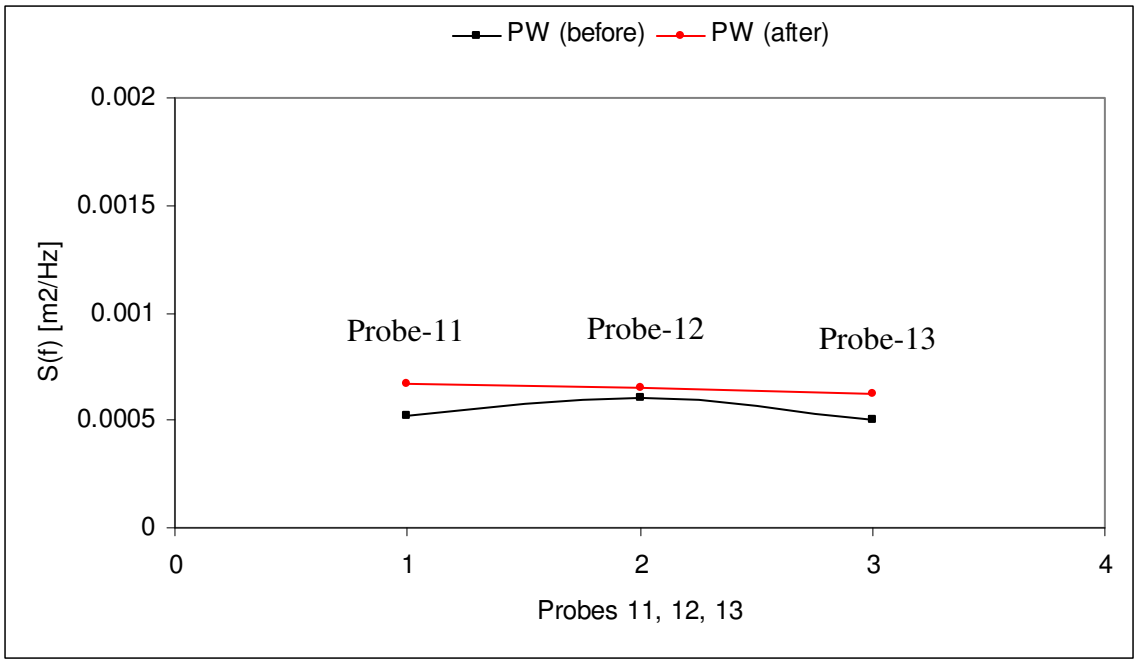

Fig. 46*k*: Cross-tank energy distribution for isolated principal waves
B5-2: BIP5_H0P06_T1P55_T1P45

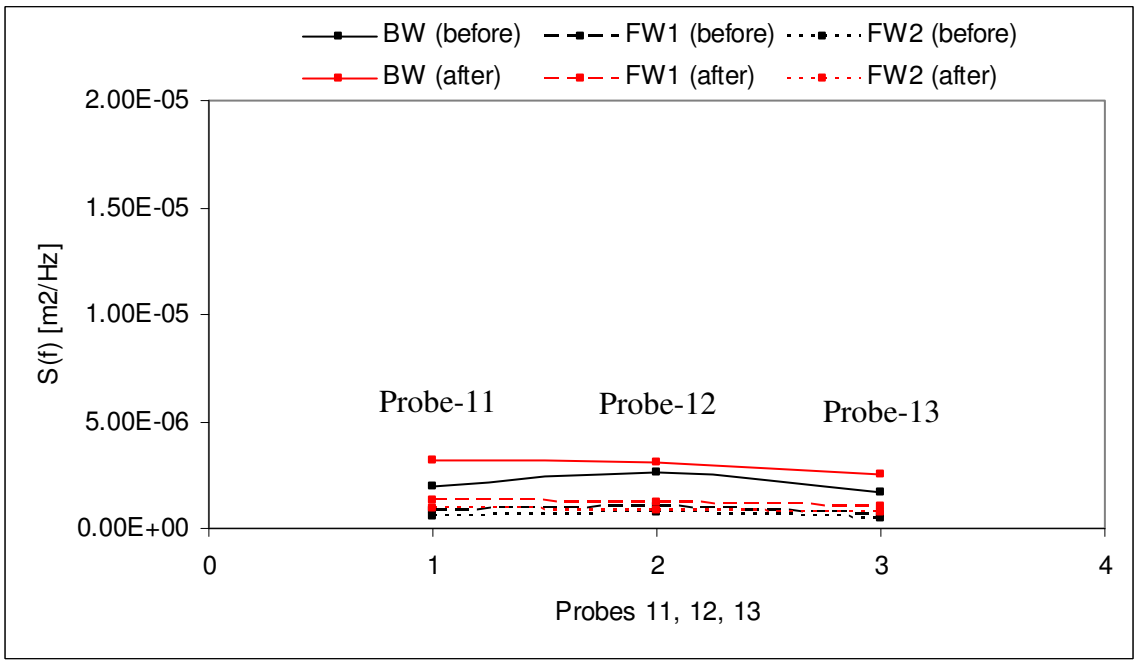

Fig. 46*l*: Cross-tank energy distribution for isolated second-order waves
B5-2: BIP5_H0P06_T1P55_T1P45

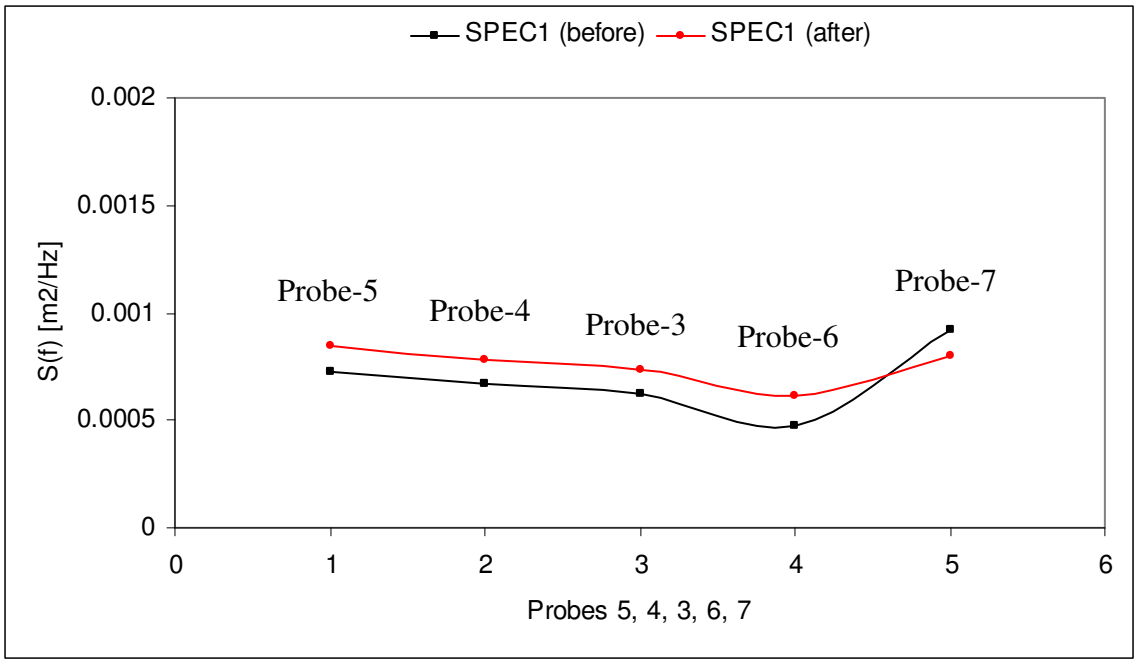

Fig. 47*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-3: BIP5_H0P06_T2P22_T2P0

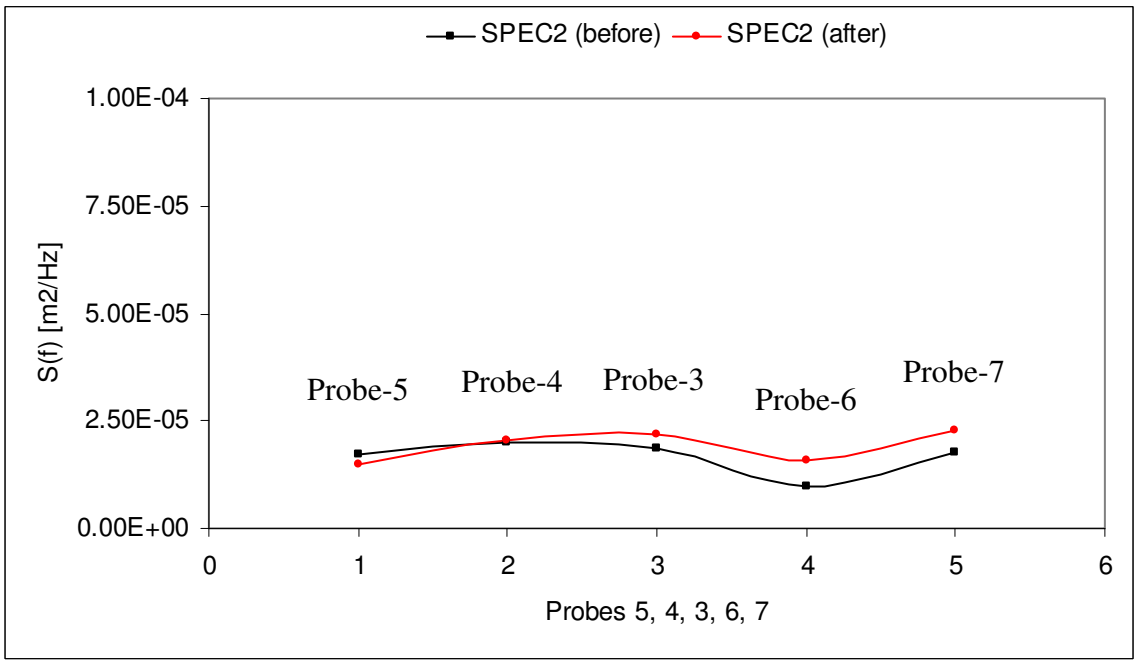

Fig. 47*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-3: BIP5_H0P06_T2P22_T2P0

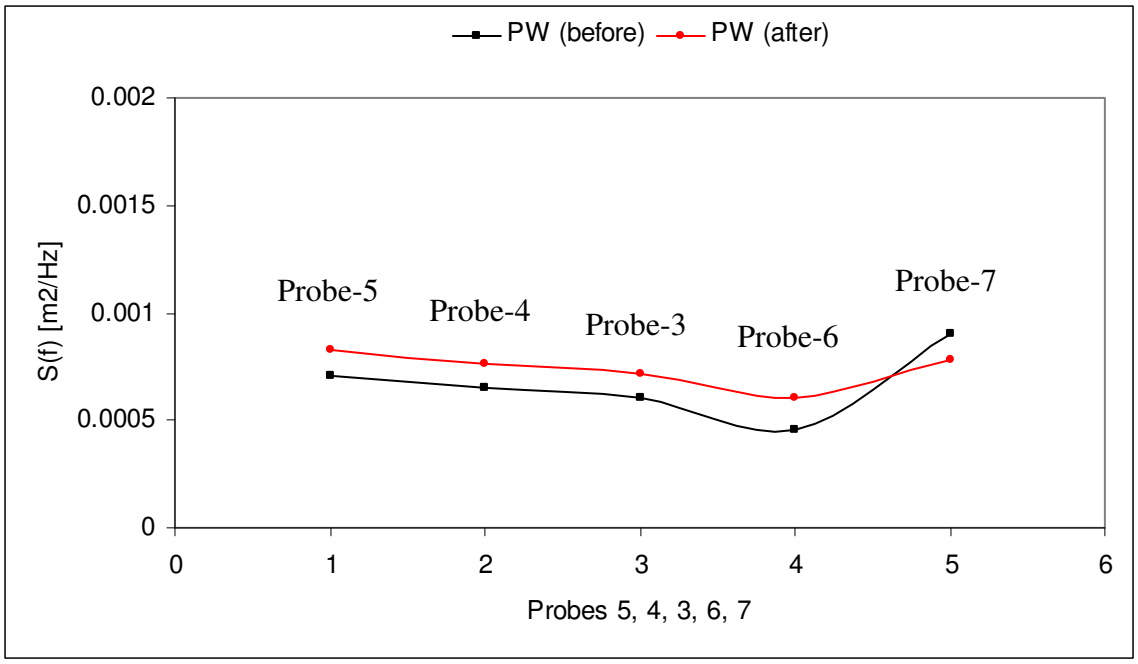

Fig. 47*c*: Cross-tank energy distribution for isolated principal waves
B5-3: BIP5_H0P06_T2P22_T2P0

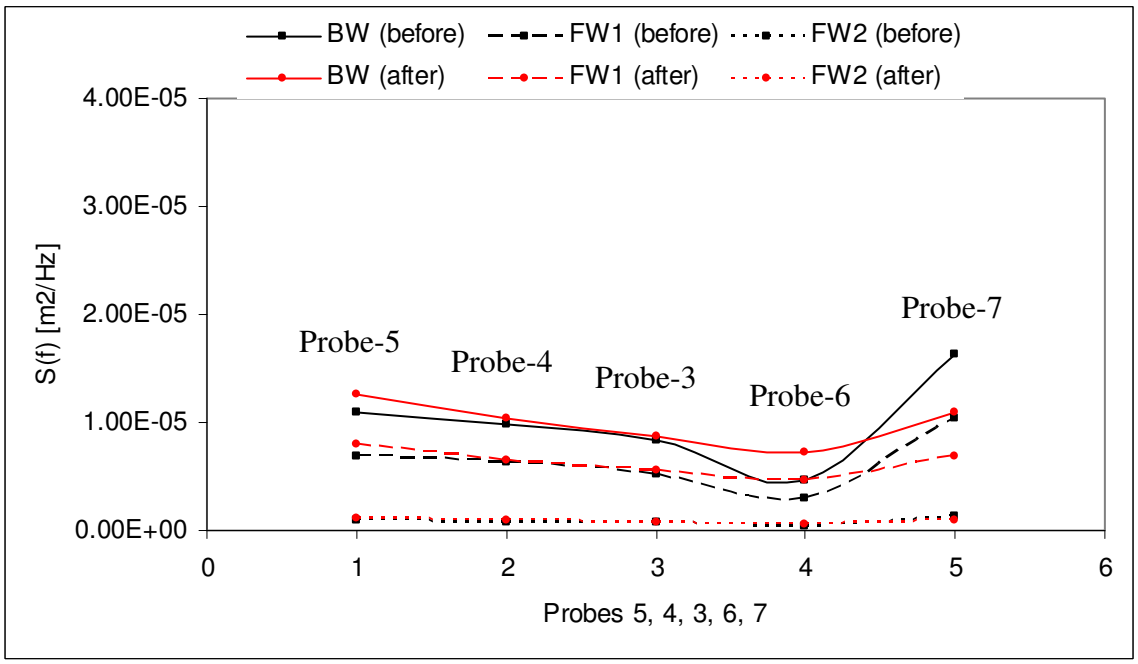

Fig. 47*d*: Cross-tank energy distribution for isolated second-order waves
B5-3: BIP5_H0P06_T2P22_T2P0

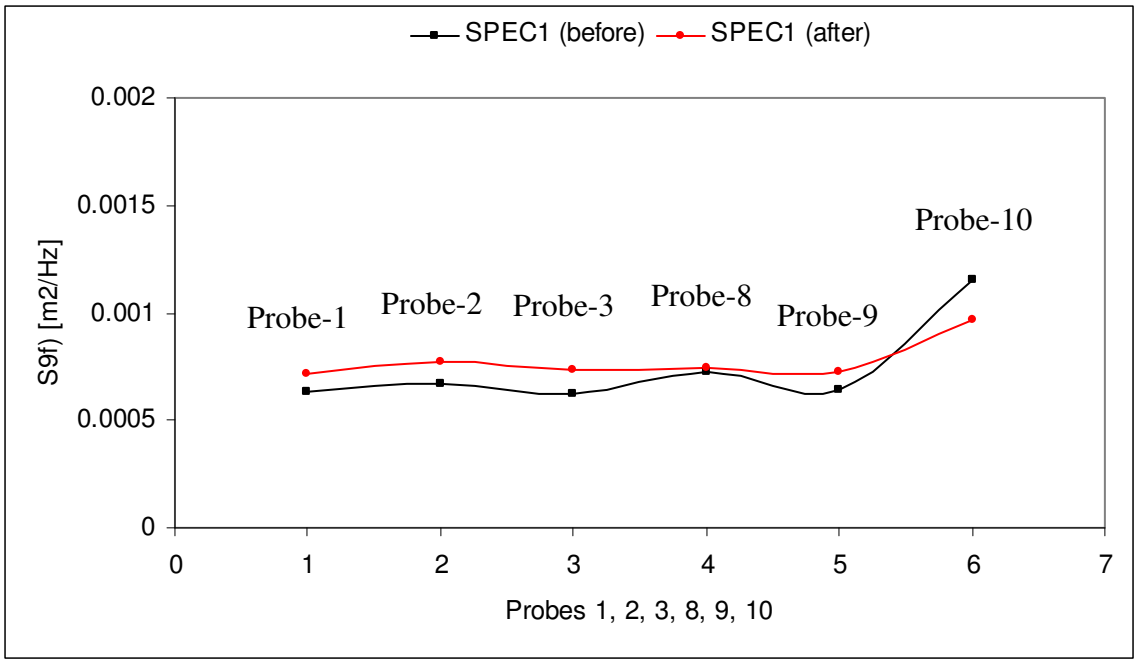

Fig. 47*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-3: BIP5_H0P06_T2P22_T2P0

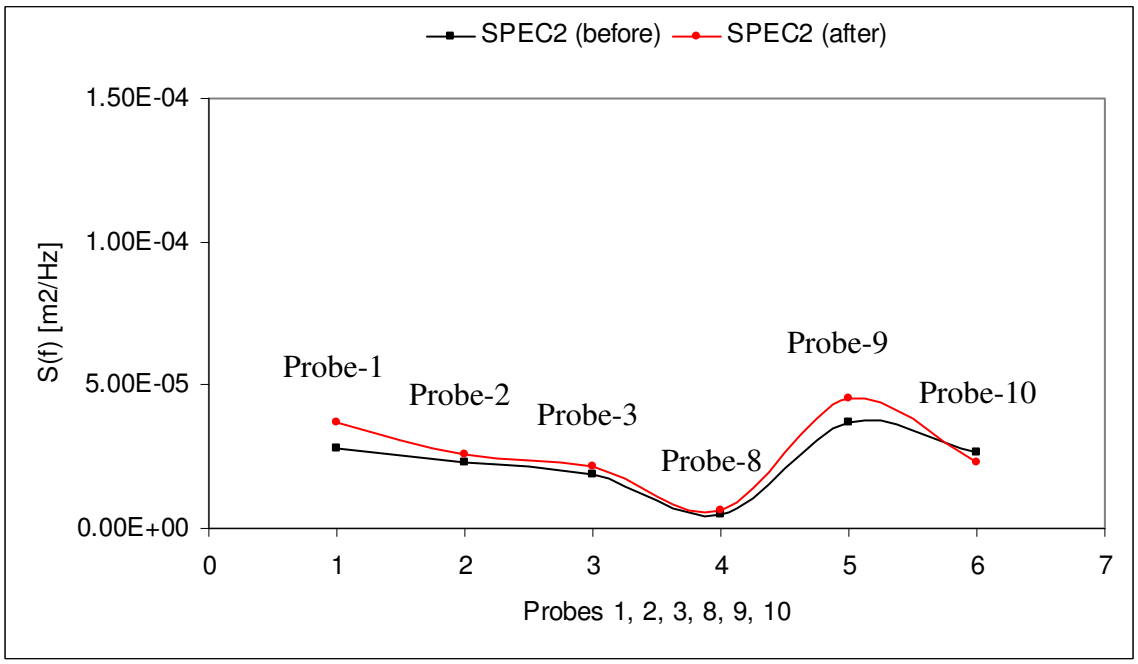

Fig. 47*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-3: BIP5_H0P06_T2P22_T2P0

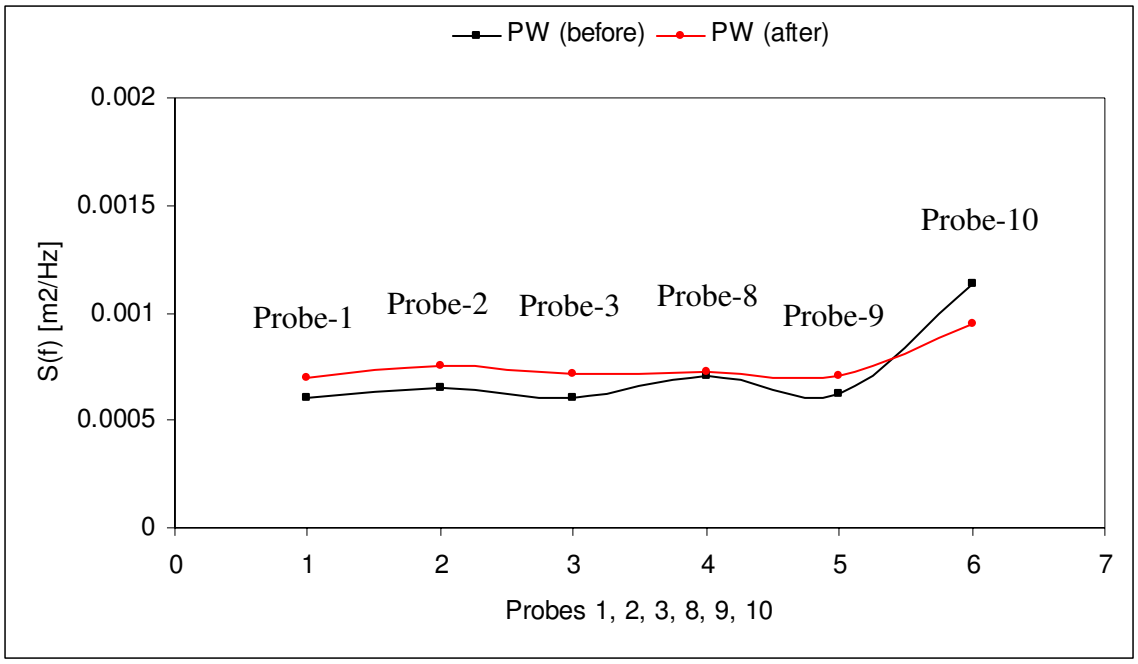

Fig. 47*g*: Along-tank energy distribution for isolated principal waves
B5-3: BIP5_H0P06_T2P22_T2P0

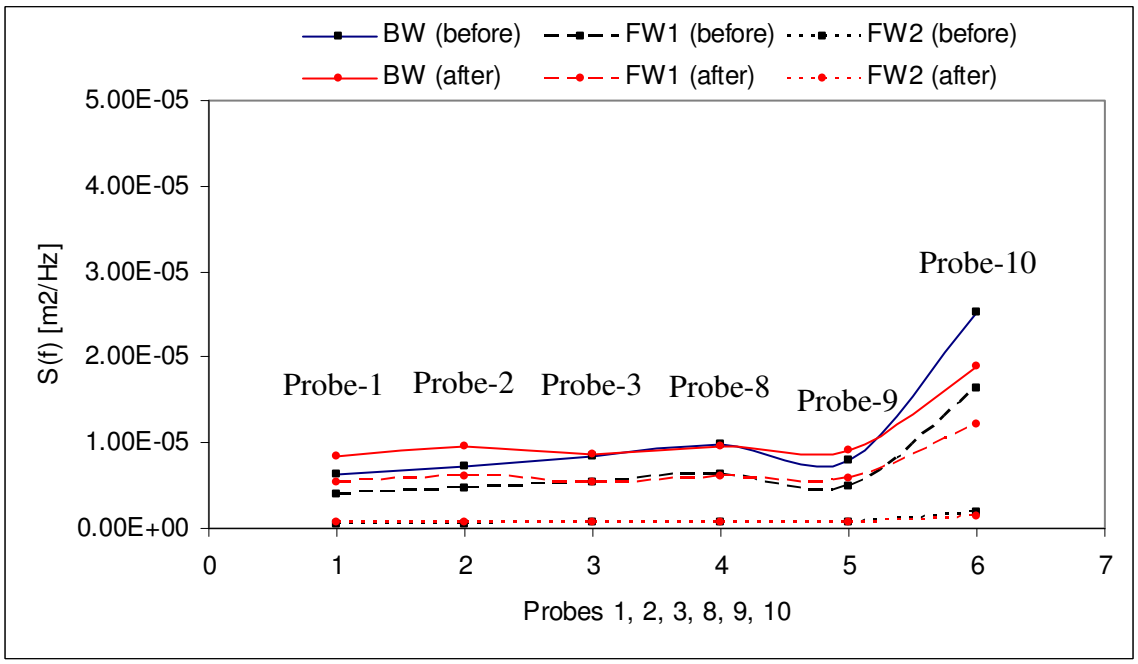

Fig. 47*h*: Along-tank energy distribution for isolated second-order waves
B5-3: BIP5_H0P06_T2P22_T2P0

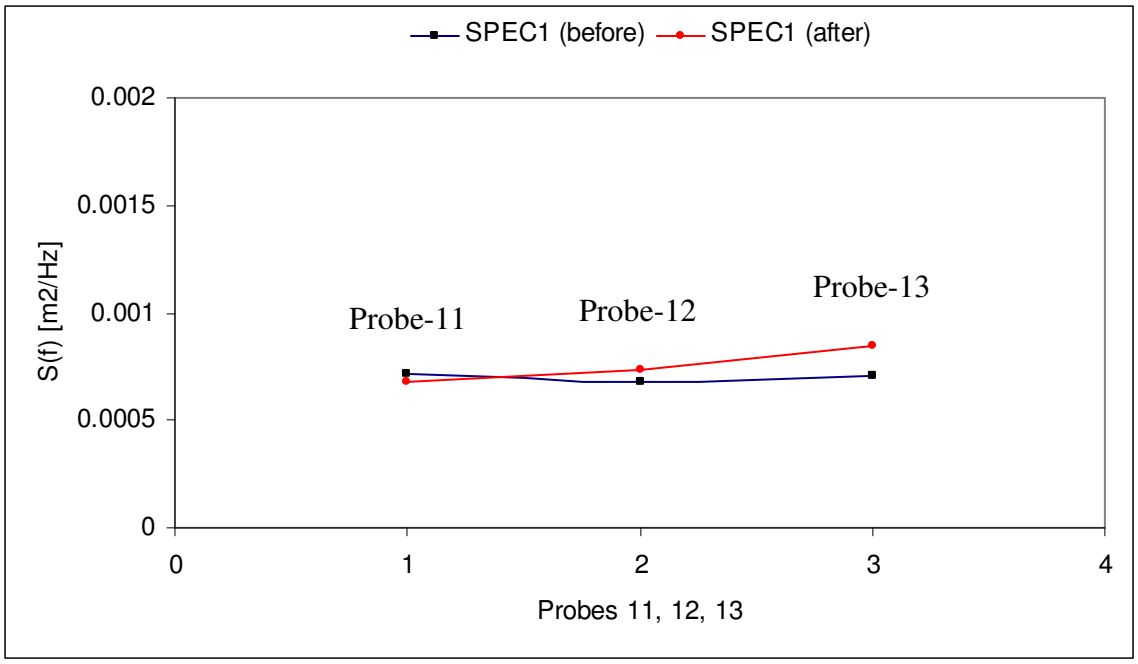

Fig. 47*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B5-3: BIP5_H0P06_T2P22_T2P0

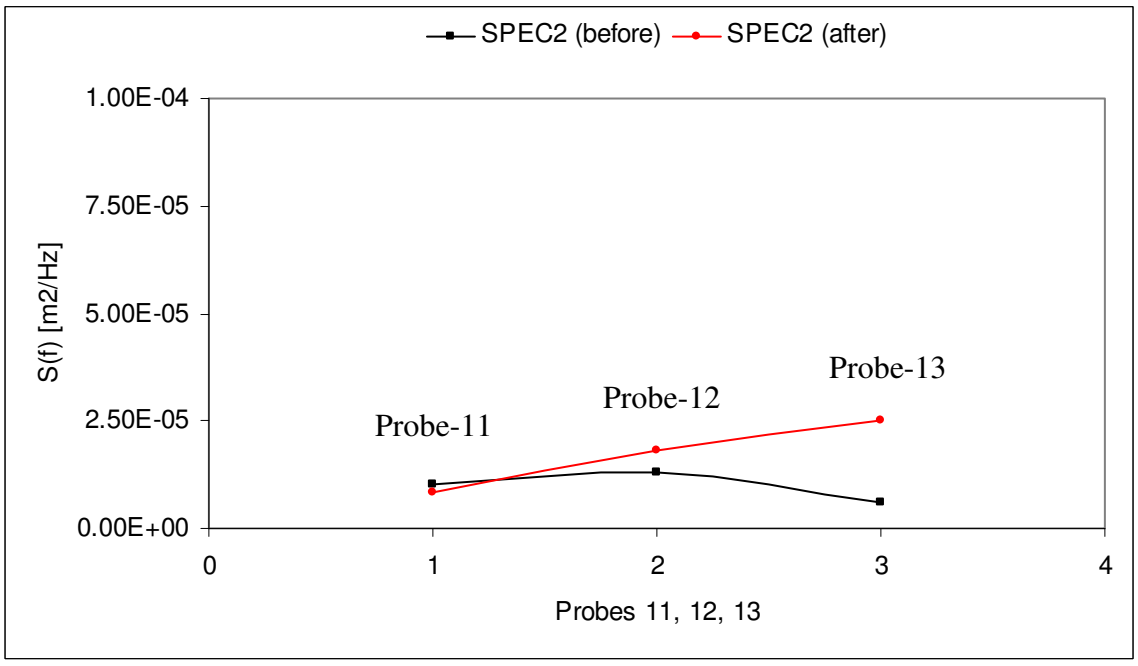

Fig. 47*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B5-3: BIP5_H0P06_T2P22_T2P0

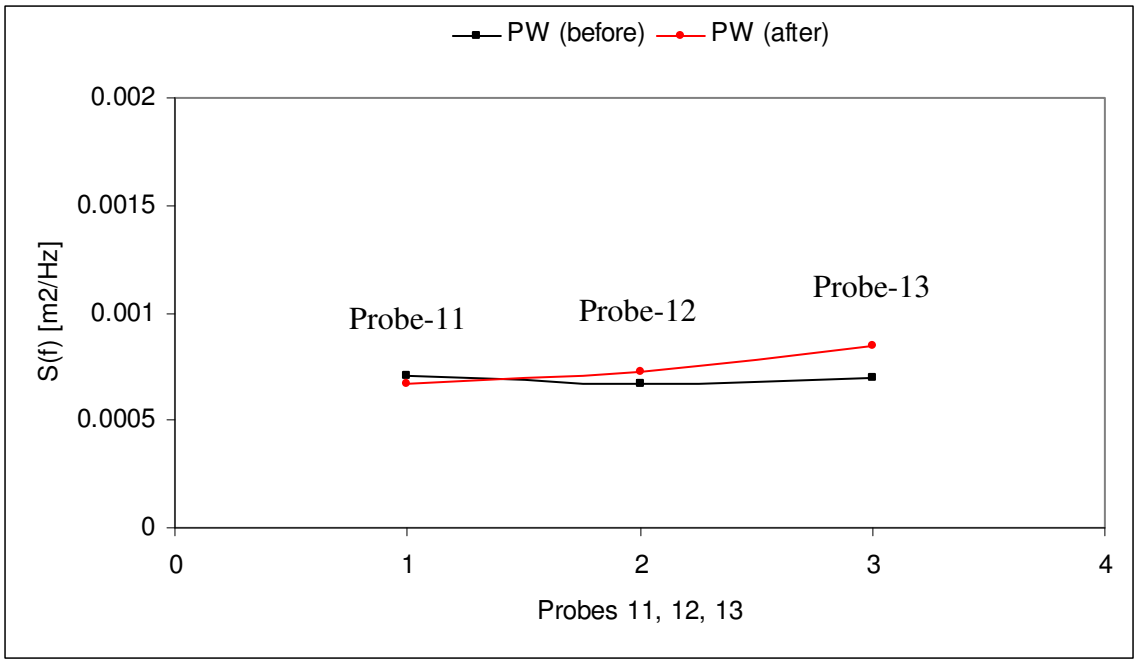

Fig. 47*k*: Cross-tank energy distribution for isolated principal waves
B5-3: BIP5_H0P06_T2P22_T2P0

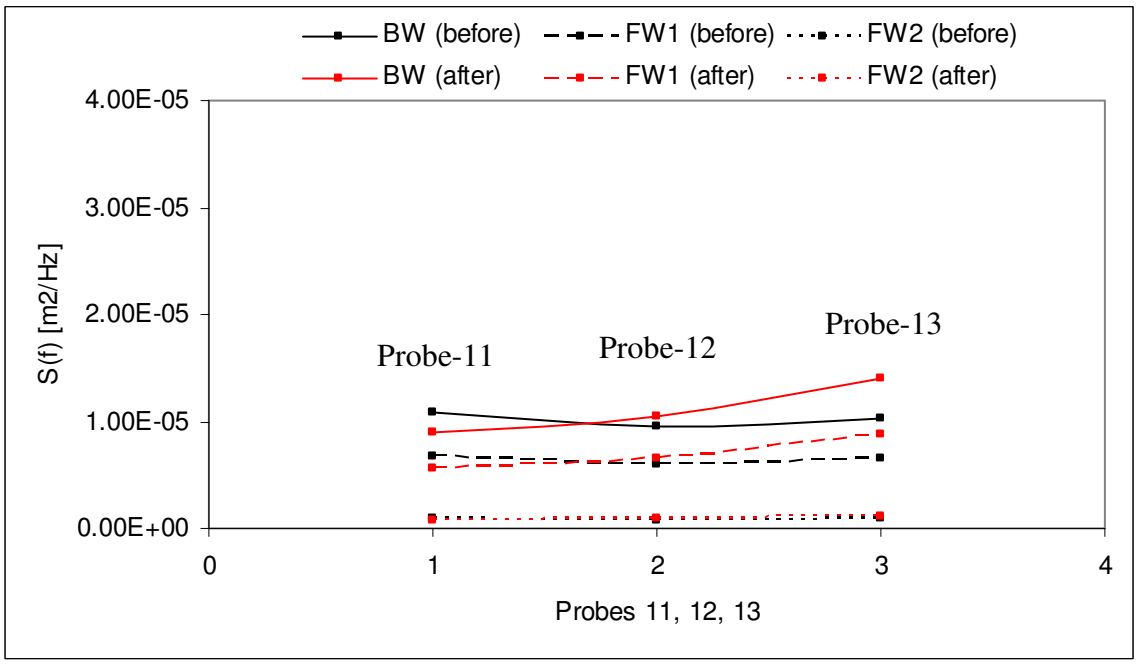

Fig. 47*l*: Cross-tank energy distribution for isolated second-order waves
B5-3: BIP5_H0P06_T2P22_T2P0

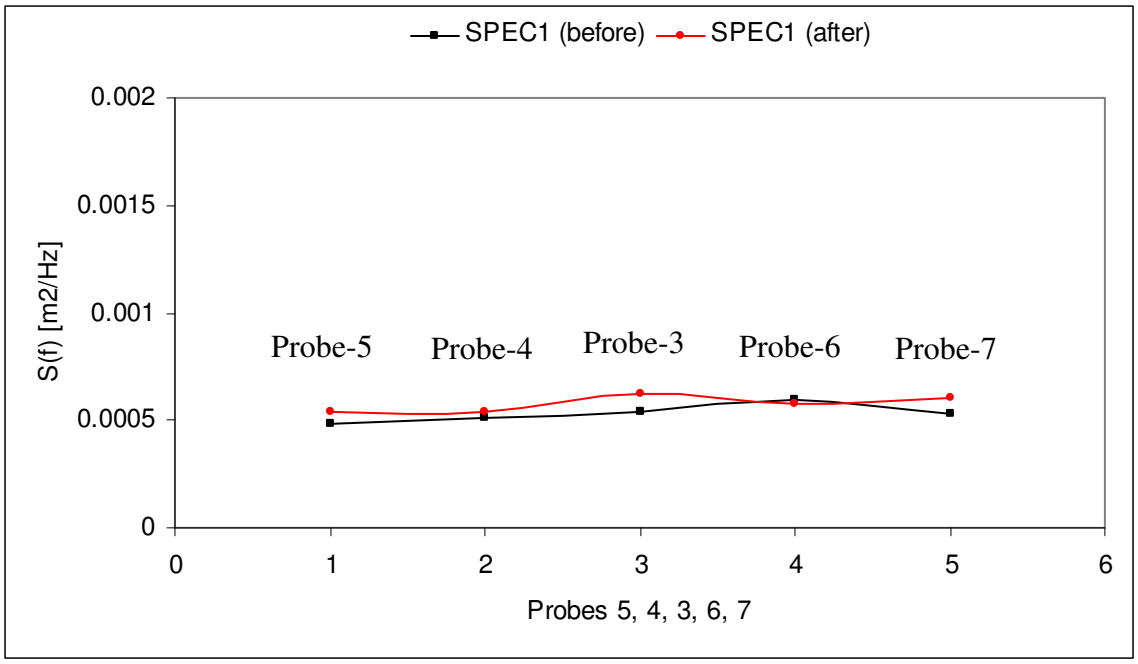

Fig. 48*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B6-1: BIP6_H0P06_T1P55_T1P45

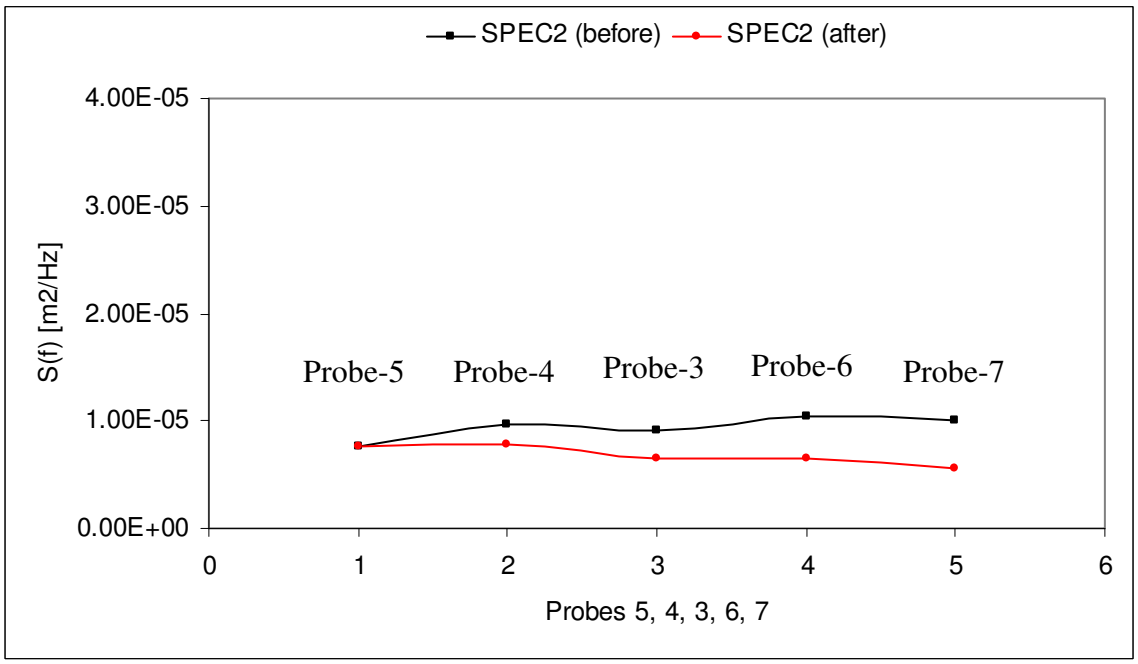

Fig. 48*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B6-1: BIP6_H0P06_T1P55_T1P45

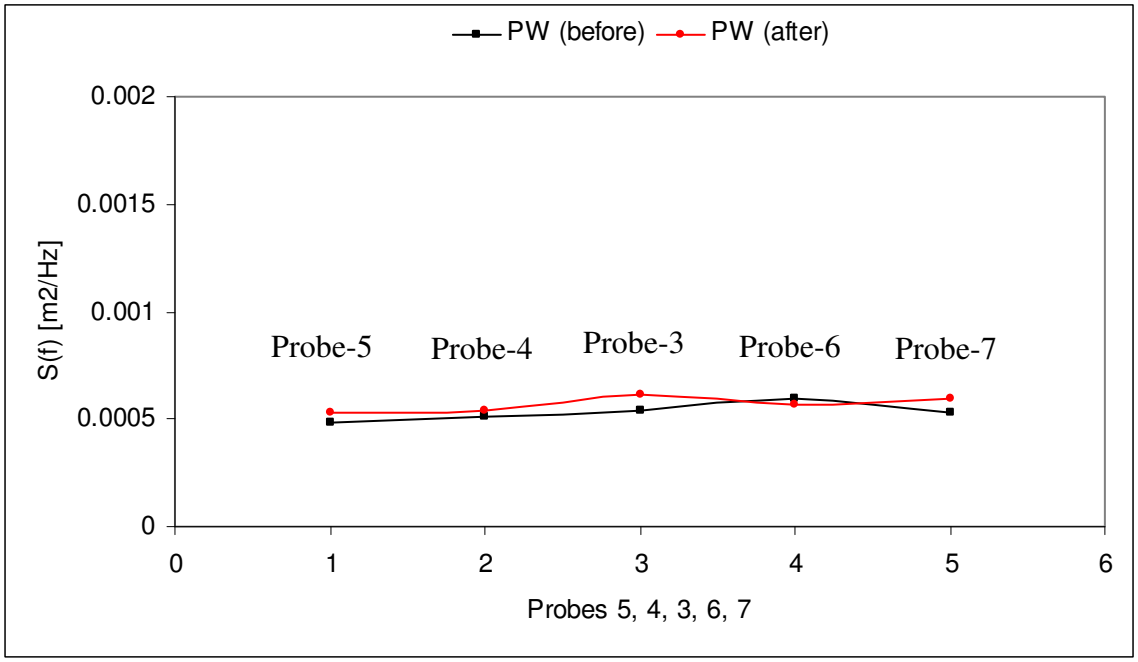

Fig. 48*c*: Cross-tank energy distribution for isolated principal waves
B6-1: BIP6_H0P06_T1P55_T1P45

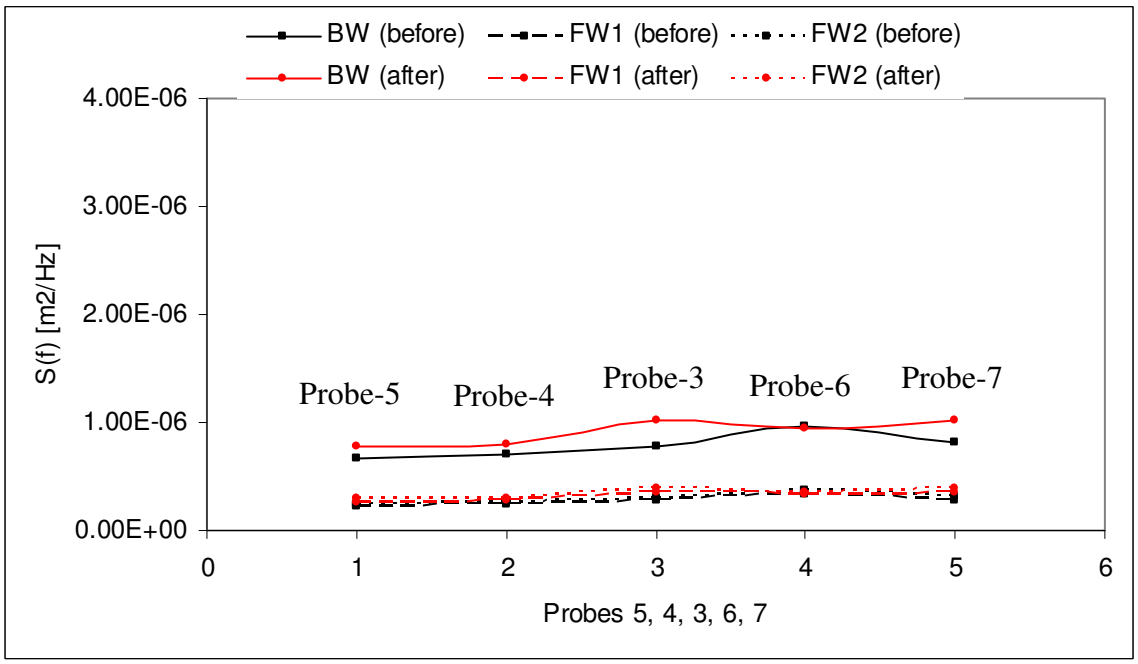

Fig. 48*d*: Cross-tank energy distribution for isolated second-order waves
B6-1: BIP6_H0P06_T1P55_T1P45

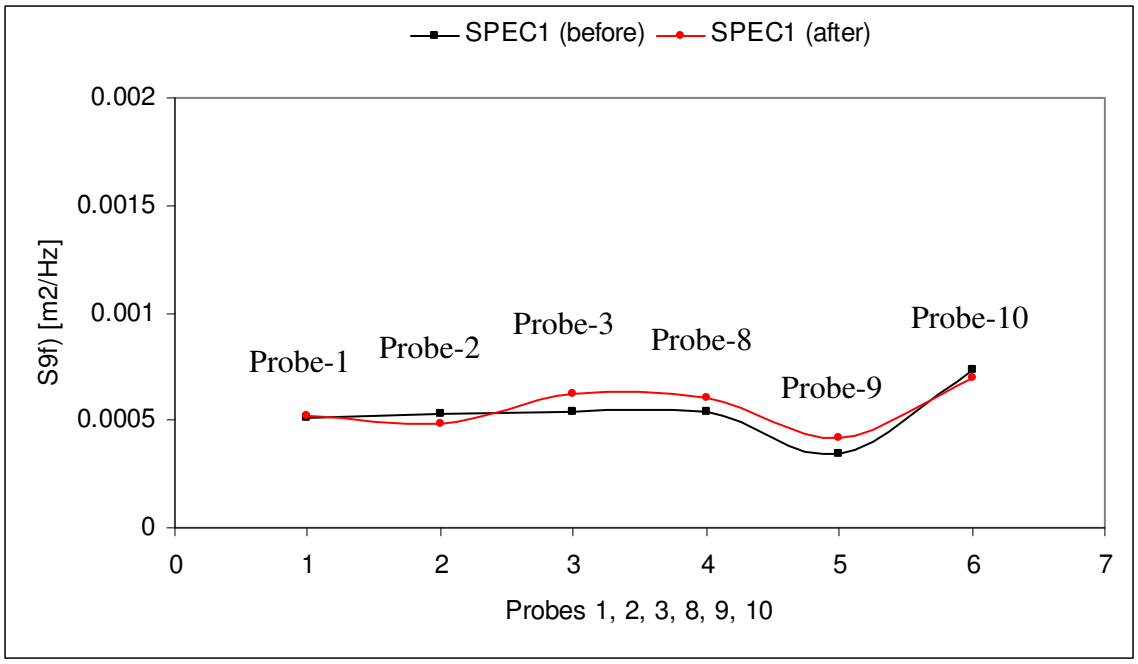

Fig. 48*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B6-1: BIP6_H0P06_T1P55_T1P45

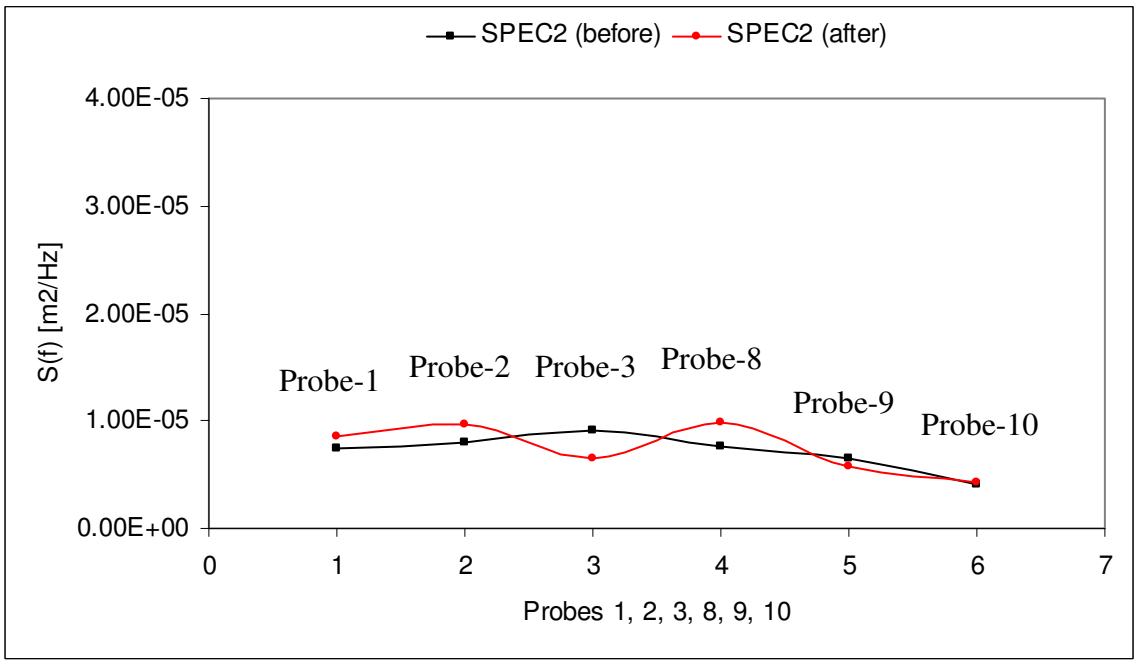

Fig. 48*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B6-1: BIP6_H0P06_T1P55_T1P45

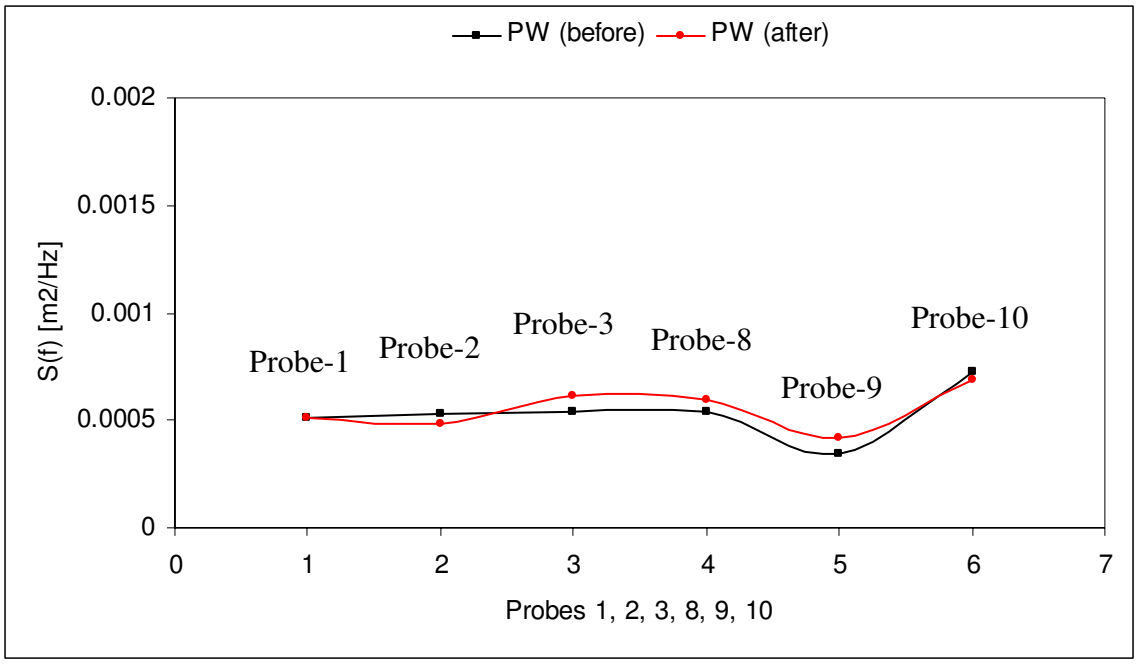

Fig. 48*g*: Along-tank energy distribution for isolated principal waves
B6-1: BIP6_H0P06_T1P55_T1P45

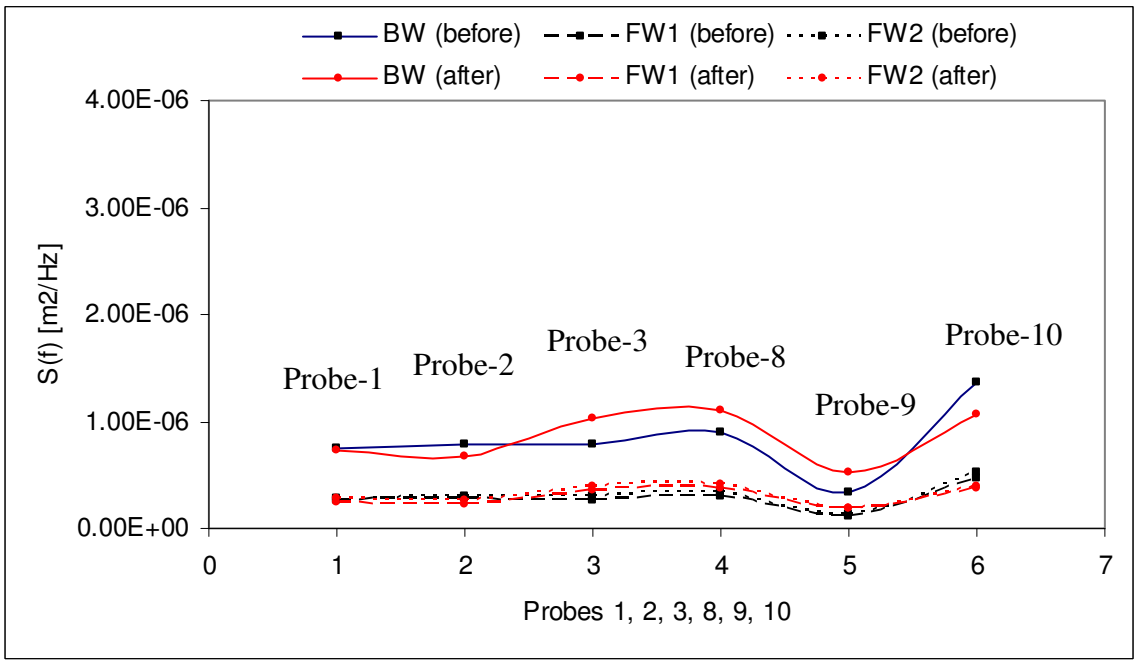

Fig. 48*h*: Along-tank energy distribution for isolated second-order waves
B6-1: BIP6_H0P06_T1P55_T1P45

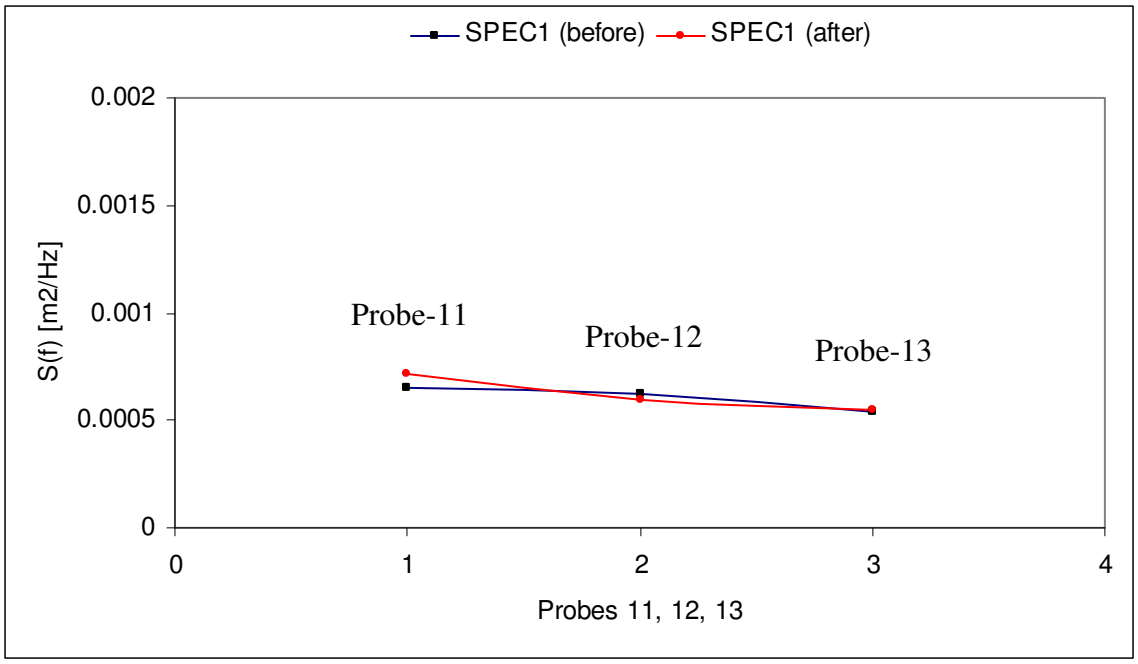

Fig. 48*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B6-1: BIP6_H0P06_T1P55_T1P45

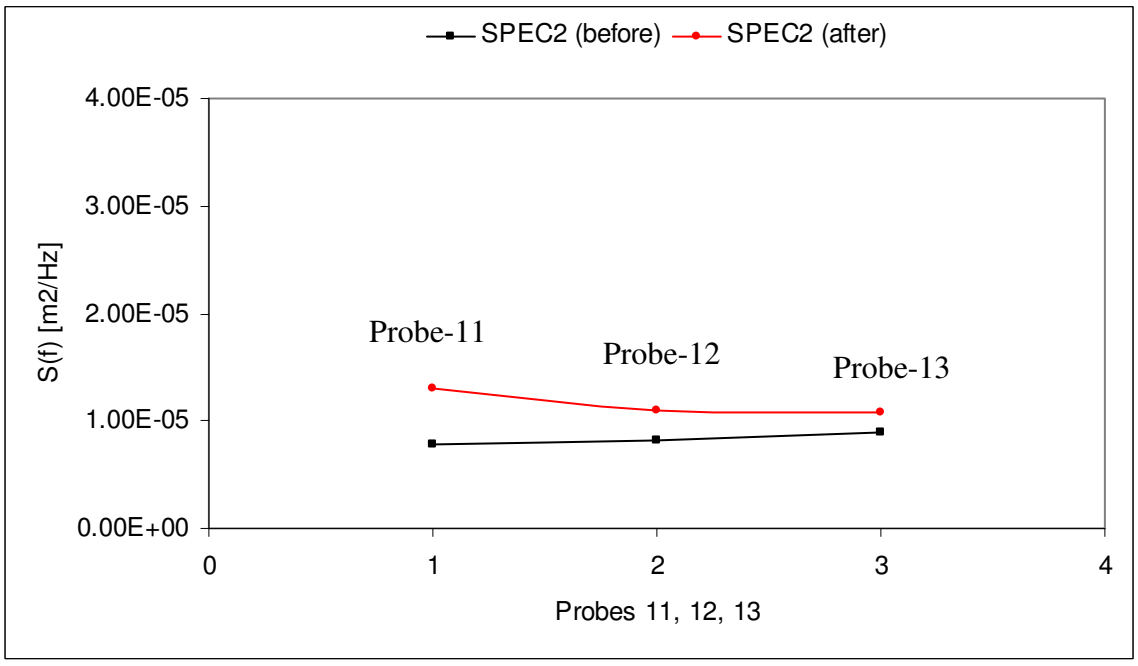

Fig. 48*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B6-1: BIP6_H0P06_T1P55_T1P45

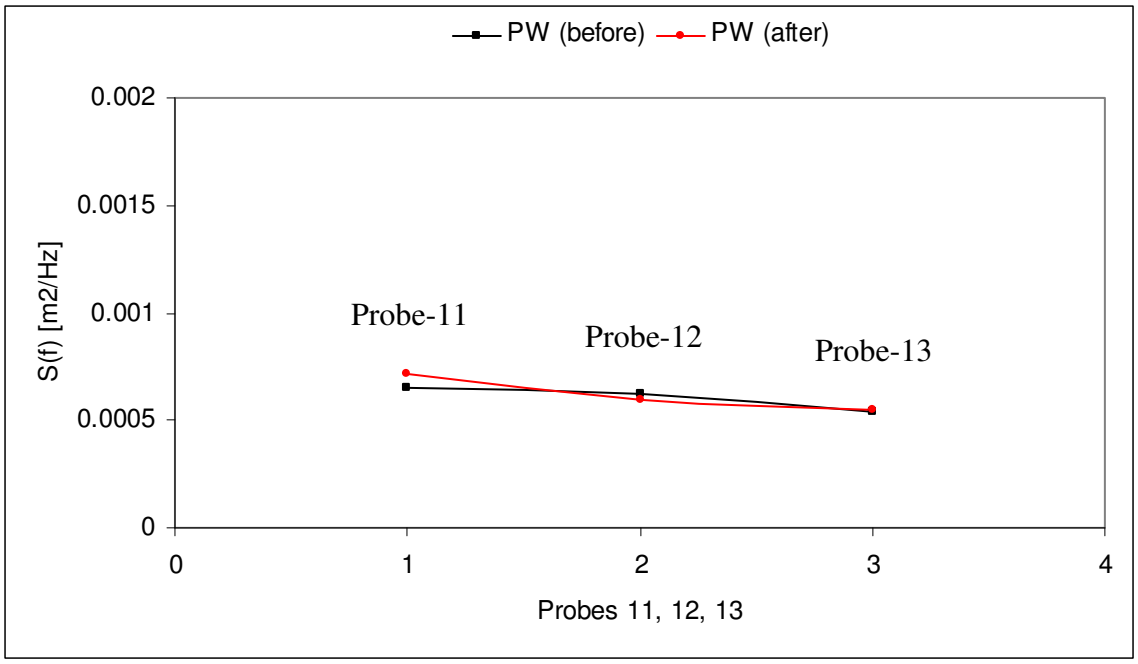

Fig. 48*k*: Cross-tank energy distribution for isolated principal waves
B6-1: BIP6_H0P06_T1P55_T1P45

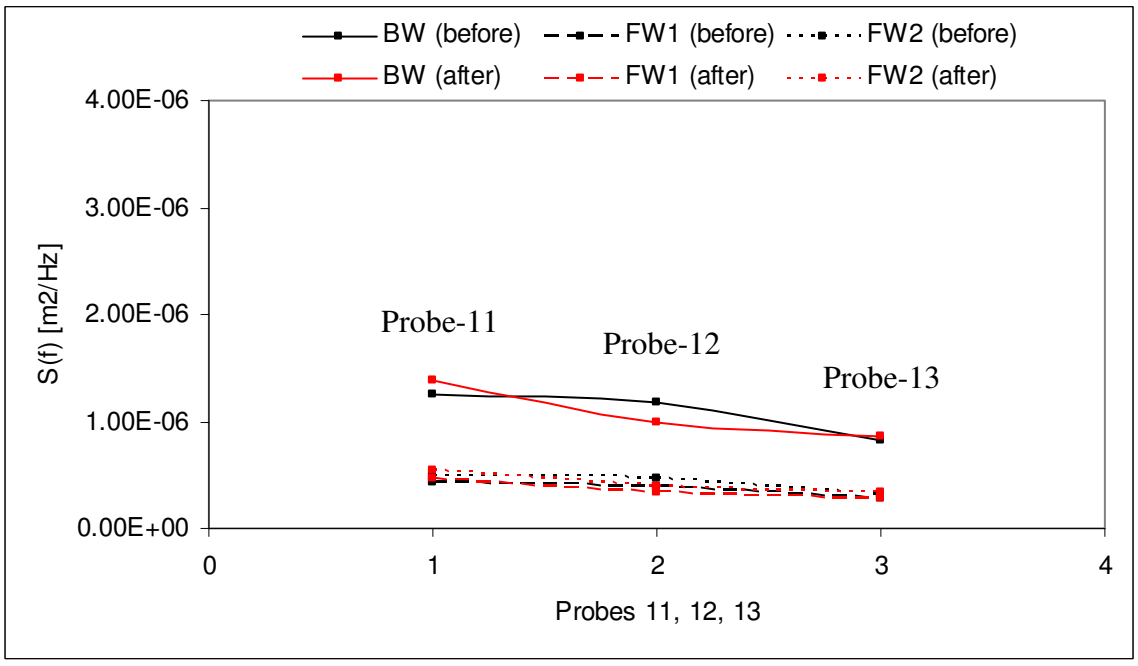

Fig. 48*l*: Cross-tank energy distribution for isolated second-order waves
B6-1: BIP6_H0P06_T1P55_T1P45

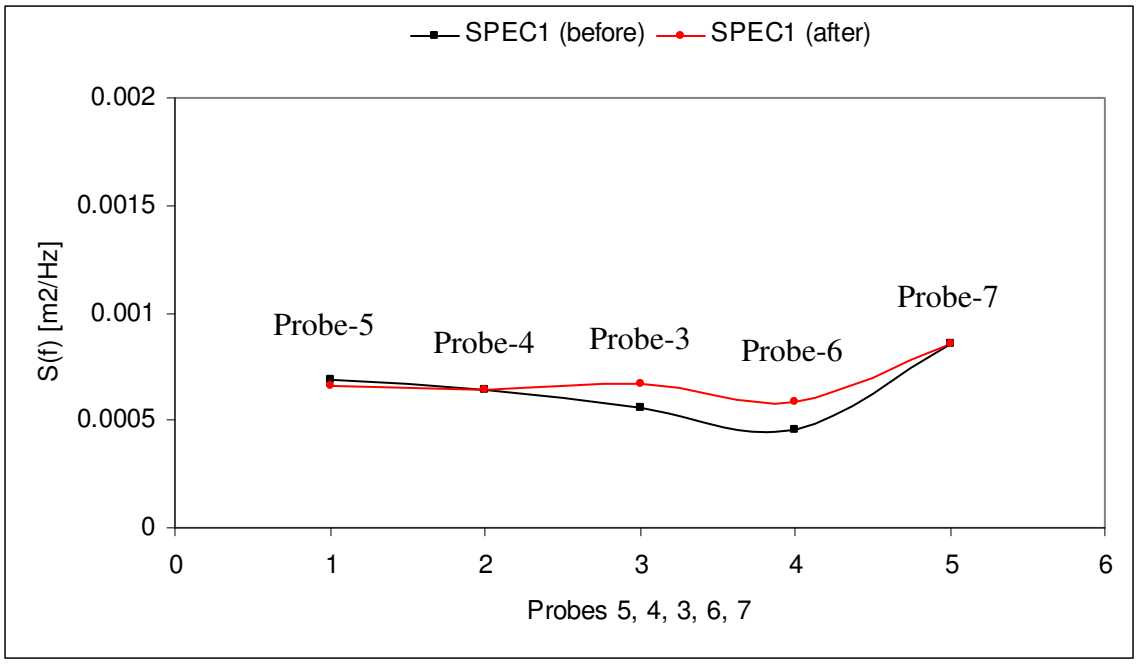

Fig. 49*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B6-2: BIP6_H0P06_T2P22_T2P0

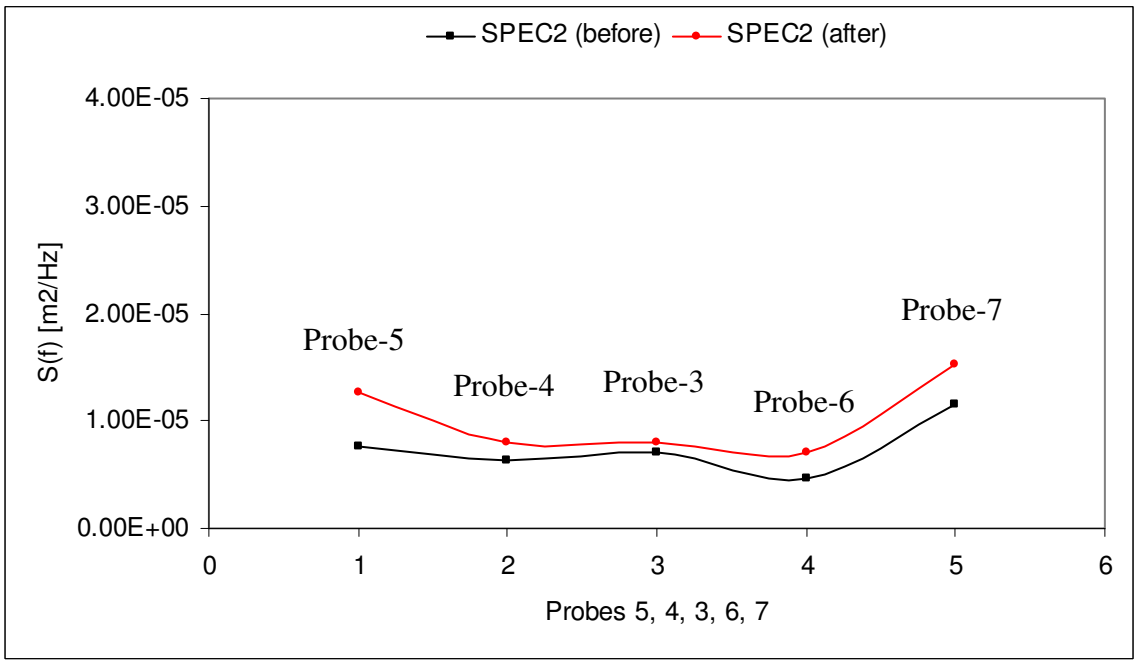

Fig. 49*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B6-2: BIP6_H0P06_T2P22_T2P0

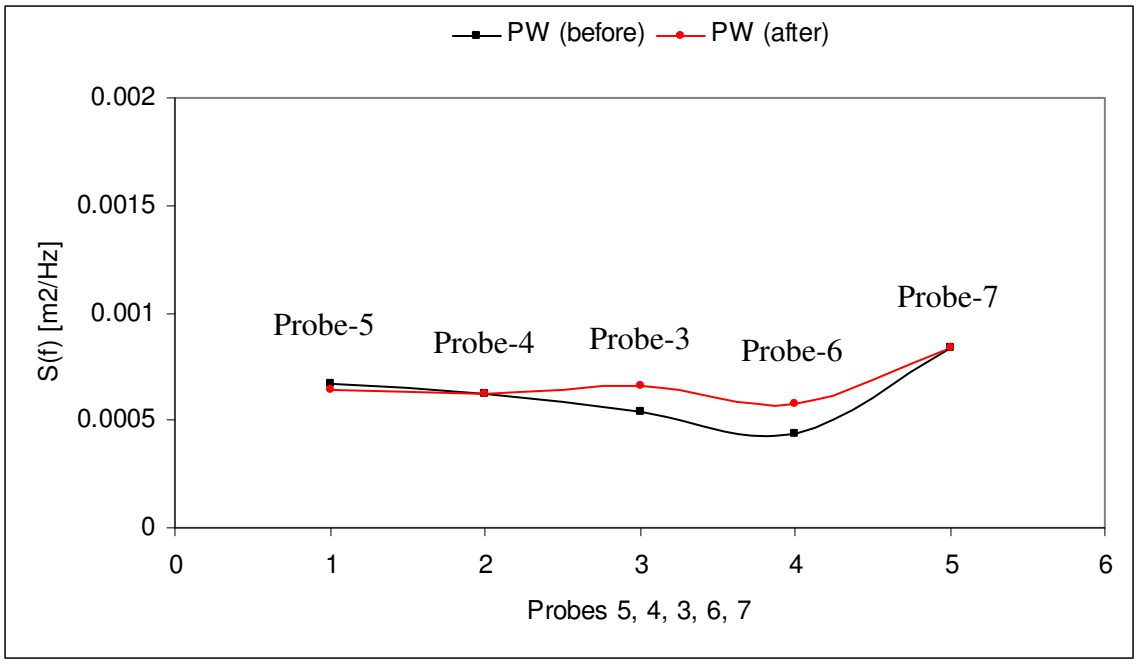

Fig. 49*c*: Cross-tank energy distribution for isolated principal waves
B6-2: BIP6_H0P06_T2P22_T2P0

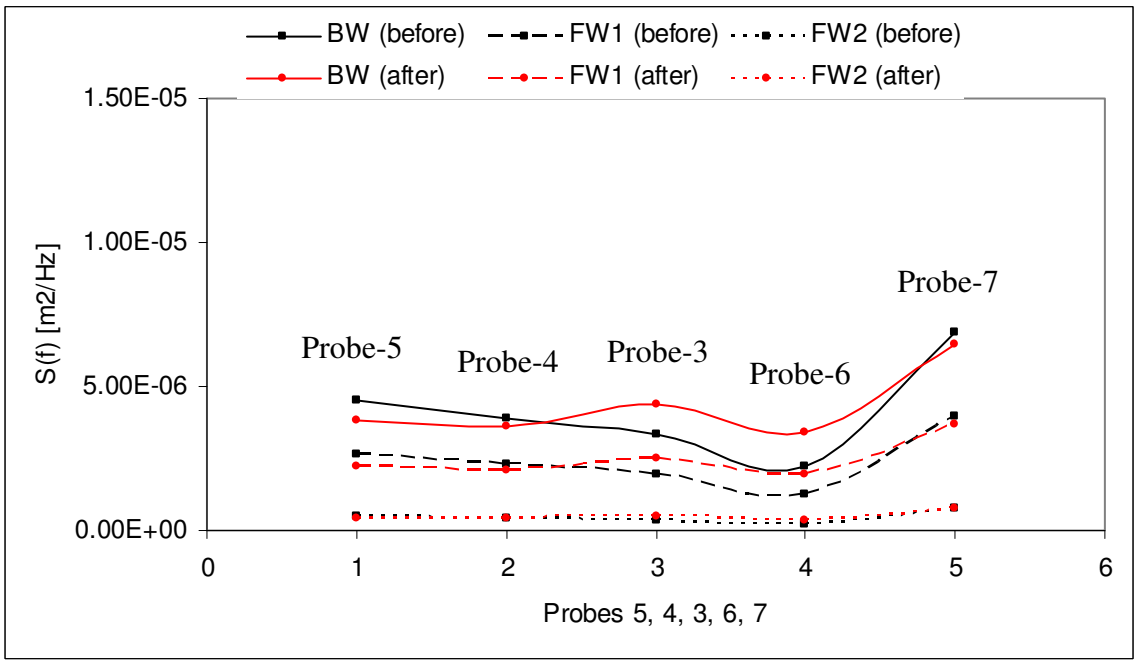

Fig. 49*d*: Cross-tank energy distribution for isolated second-order waves
B6-2: BIP6_H0P06_T2P22_T2P0

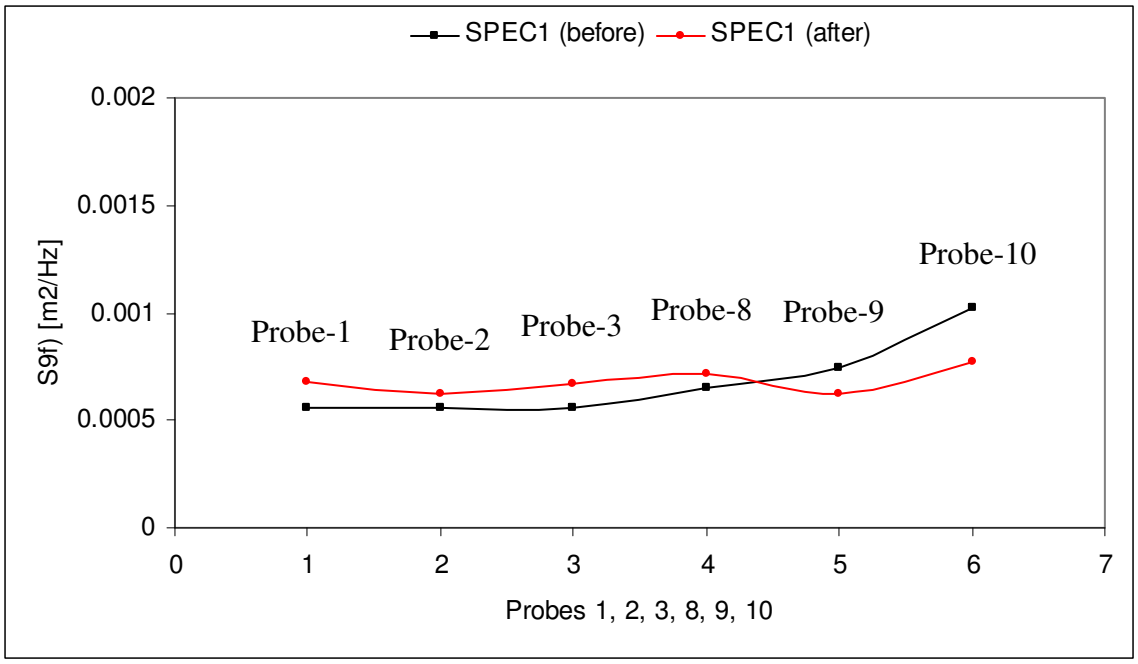

Fig. 49*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B6-2: BIP6_H0P06_T2P22_T2P0

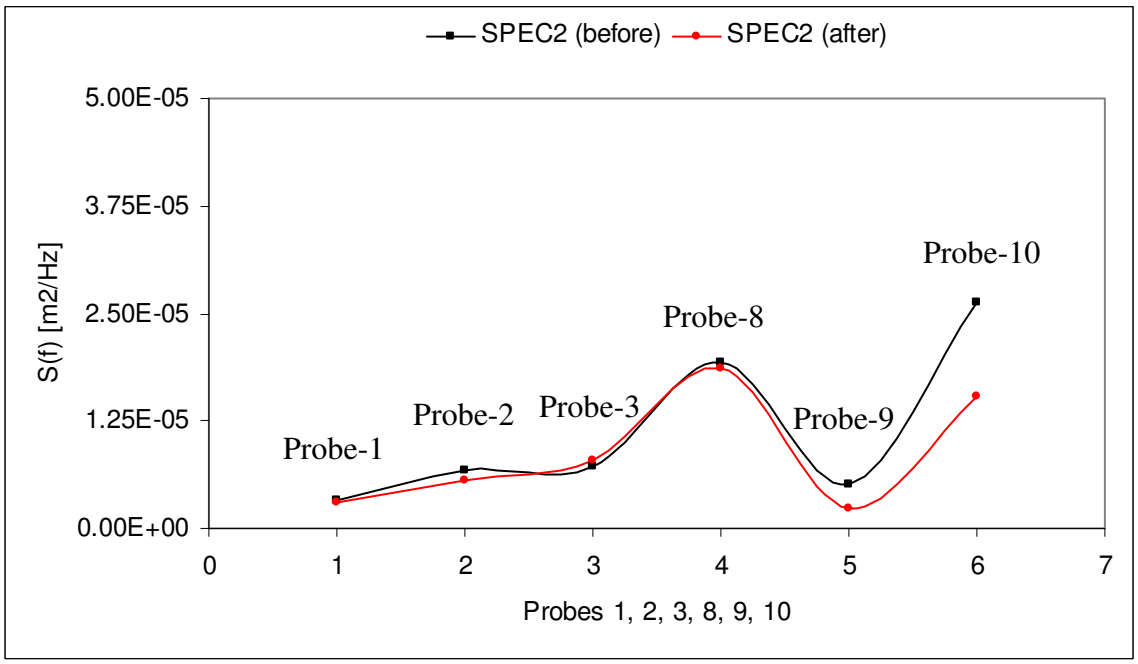

Fig. 49*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B6-2: BIP6_H0P06_T2P22_T2P0

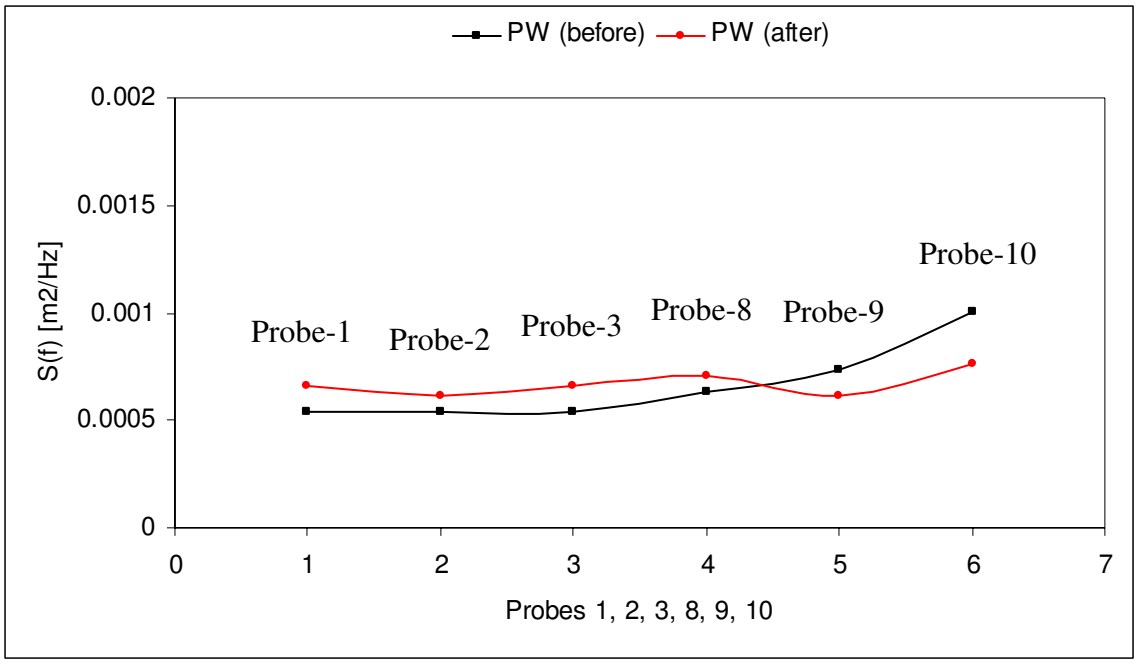

Fig. 49*g*: Along-tank energy distribution for isolated principal waves
B6-2: BIP6_H0P06_T2P22_T2P0

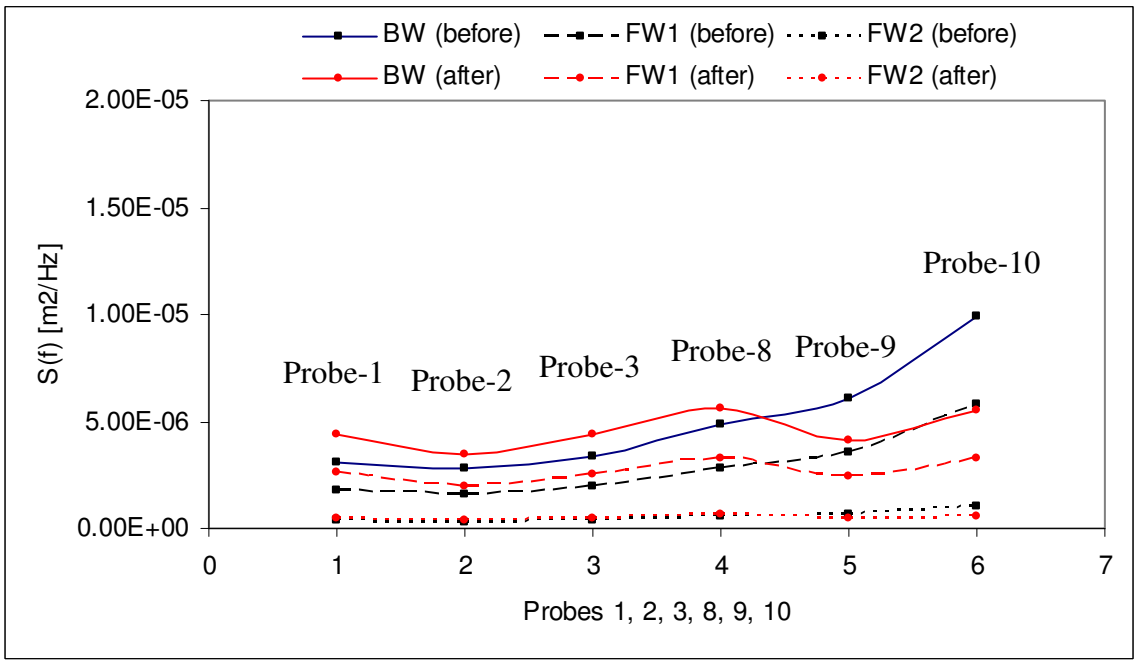

Fig. 49*h*: Along-tank energy distribution for isolated second-order waves
B6-2: BIP6_H0P06_T2P22_T2P0

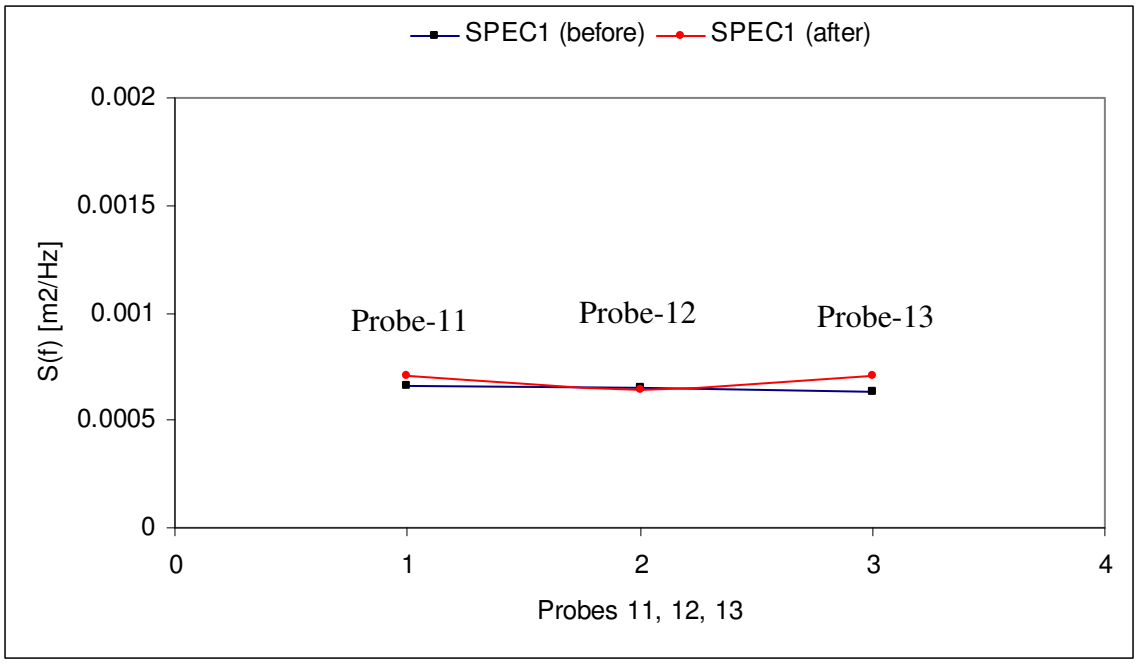

Fig. 49*i*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B6-2: BIP6_H0P06_T2P22_T2P0

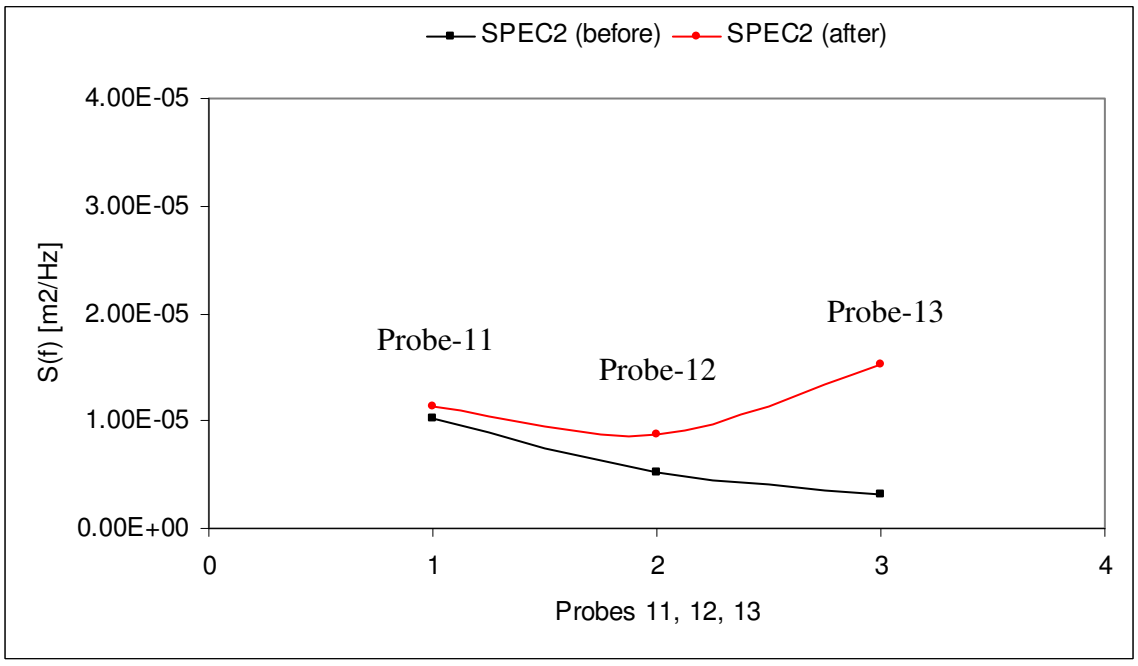

Fig. 49*j*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B6-2: BIP6_H0P06_T2P22_T2P0

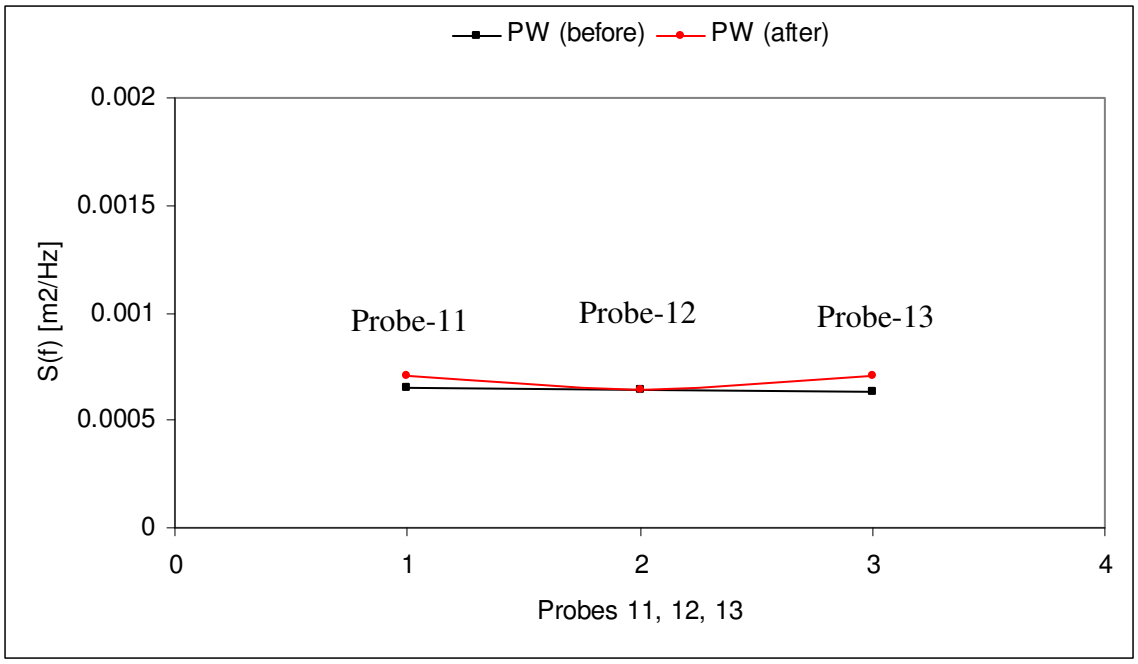

Fig. 49*k*: Cross-tank energy distribution for isolated principal waves
B6-2: BIP6_H0P06_T2P22_T2P0

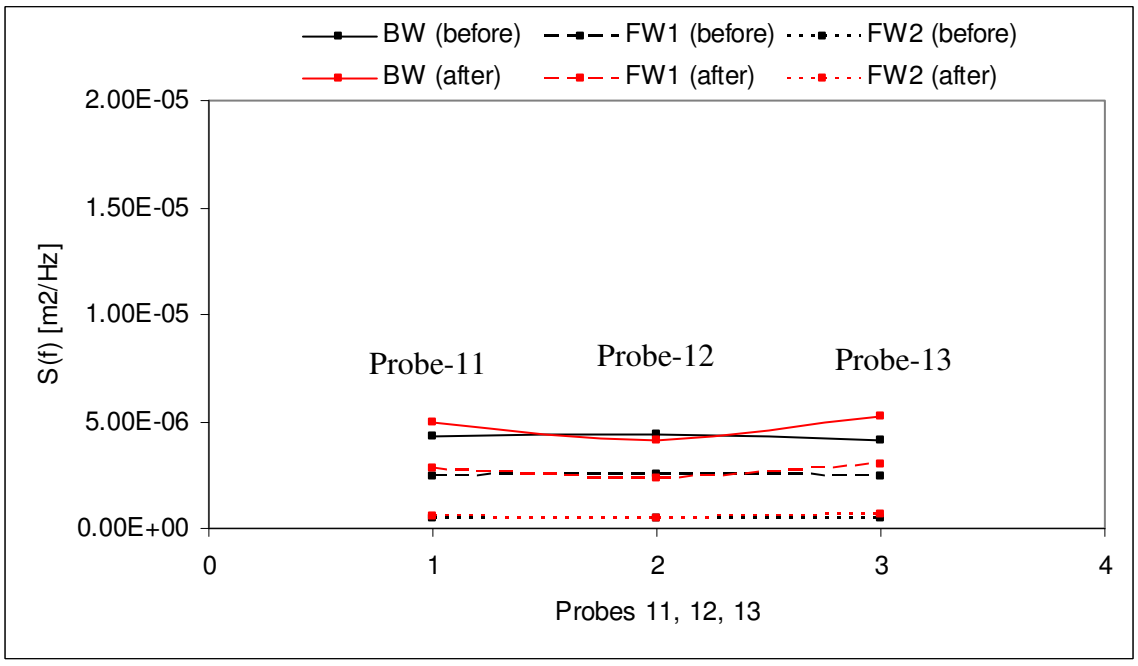

Fig. 49*l*: Cross-tank energy distribution for isolated second-order waves
B6-2: BIP6_H0P06_T2P22_T2P0

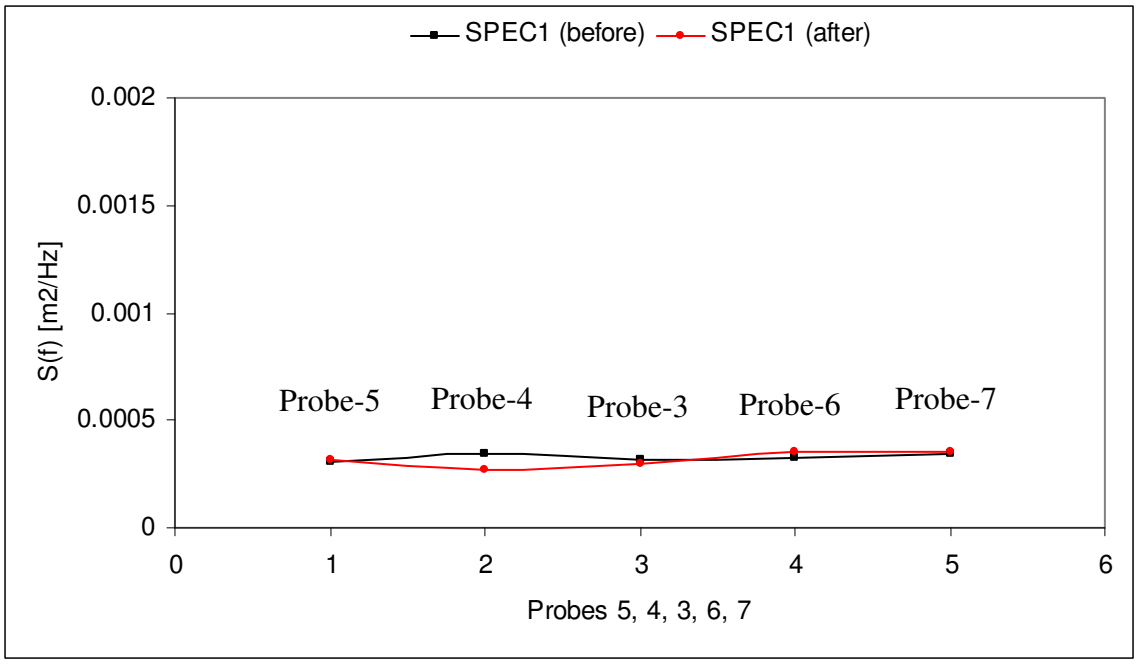

Fig. 50*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-1: BIP8_H0P06_T1P0_T0P9

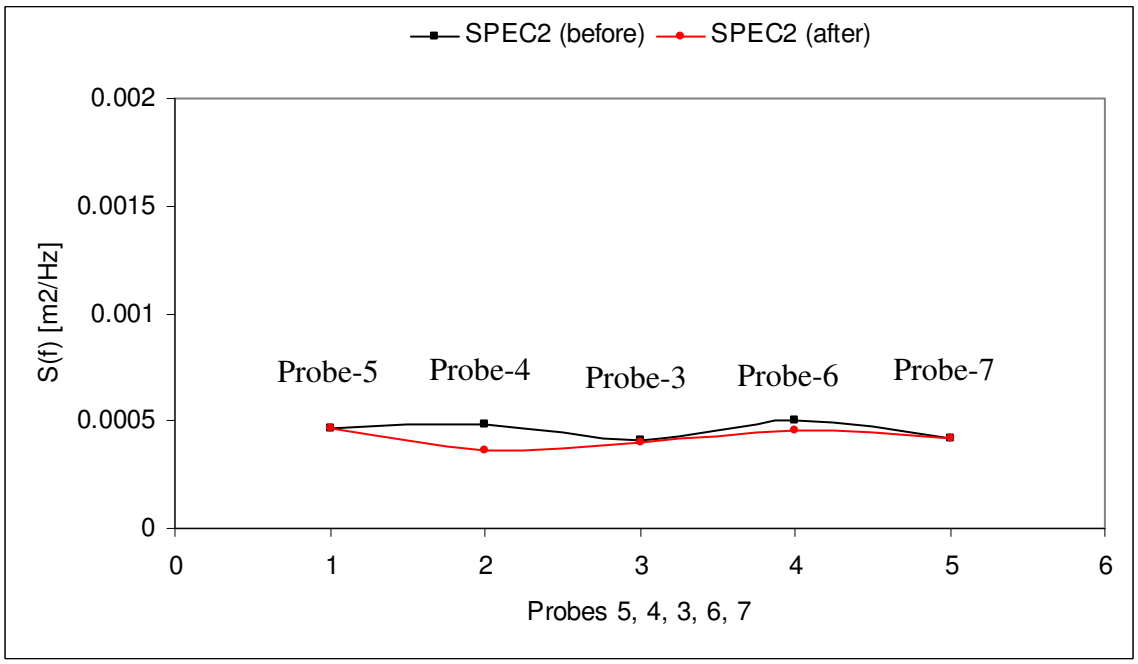

Fig. 50*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-1: BIP8_H0P06_T1P0_T0P9

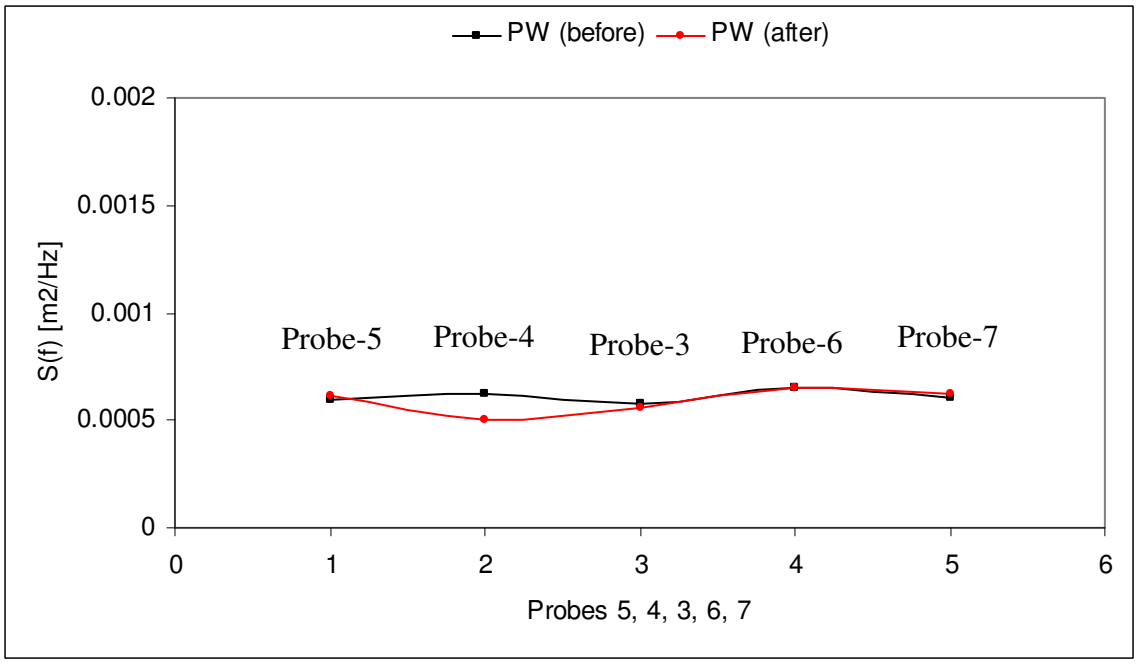

Fig. 50*c*: Cross-tank energy distribution for isolated principal waves
B8-1: BIP8_H0P06_T1P0_T0P9

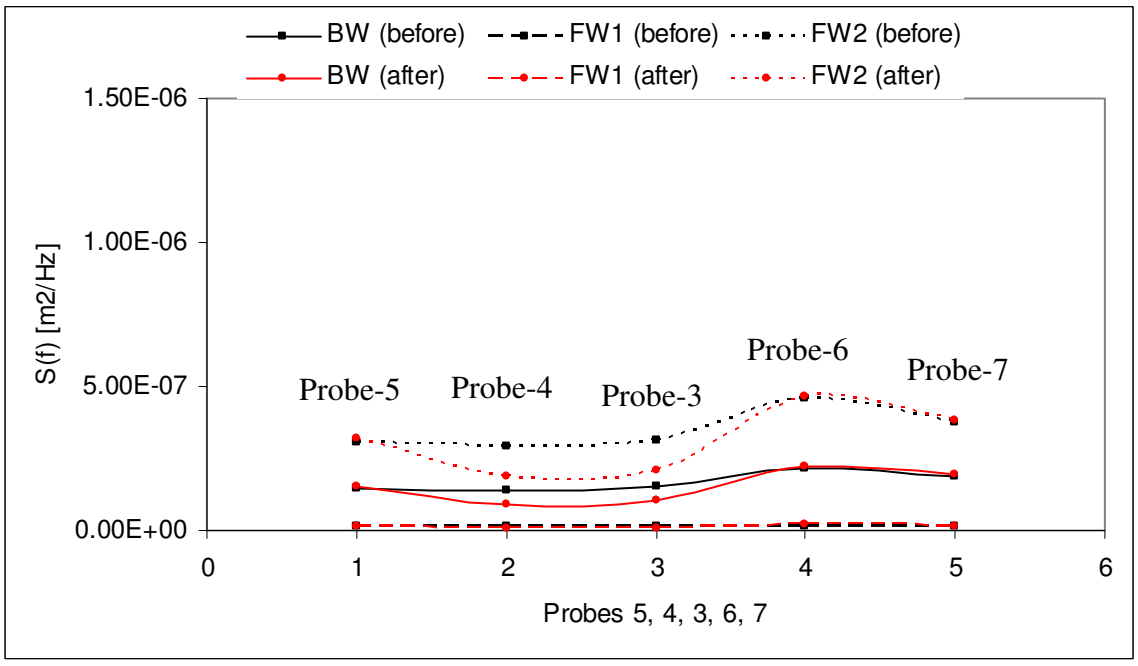

Fig. 50*d*: Cross-tank energy distribution for isolated second-order waves
B8-1: BIP8_H0P06_T1P0_T0P9

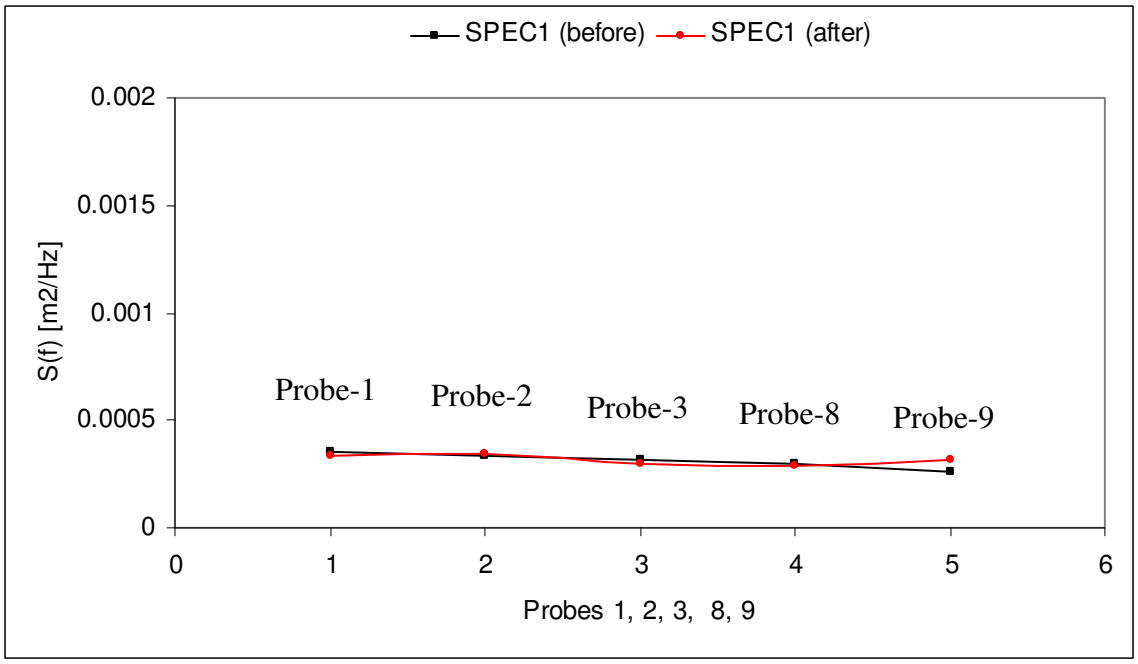

Fig. 50*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-1: BIP8_H0P06_T1P0_T0P9

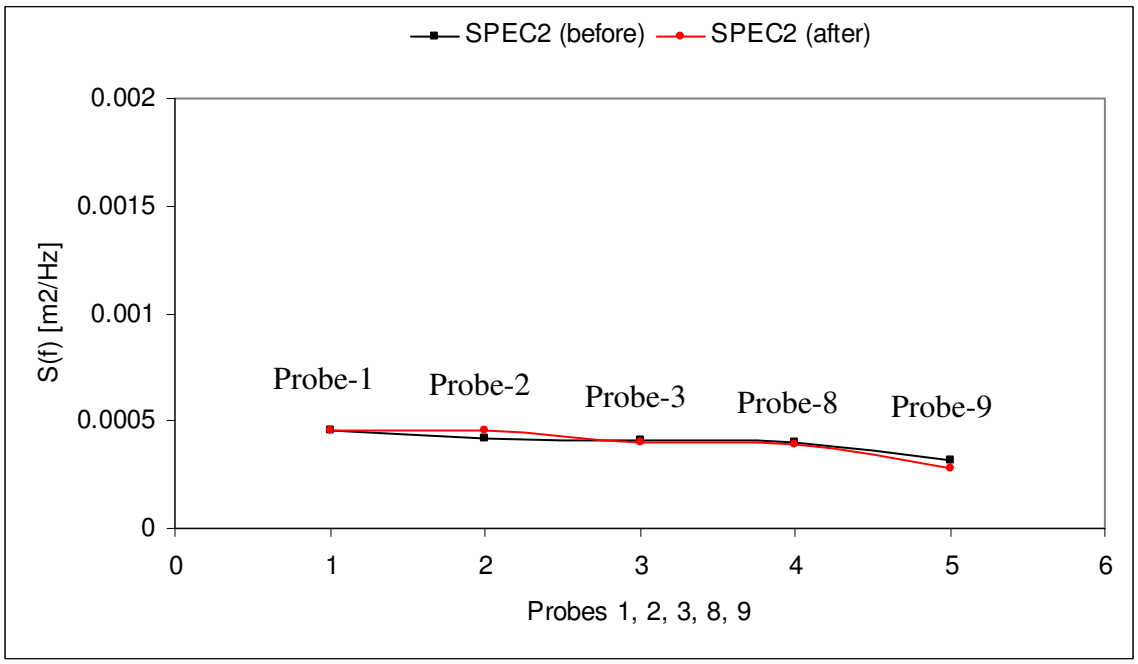

Fig. 50*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-1: BIP8_H0P06_T1P0_T0P9

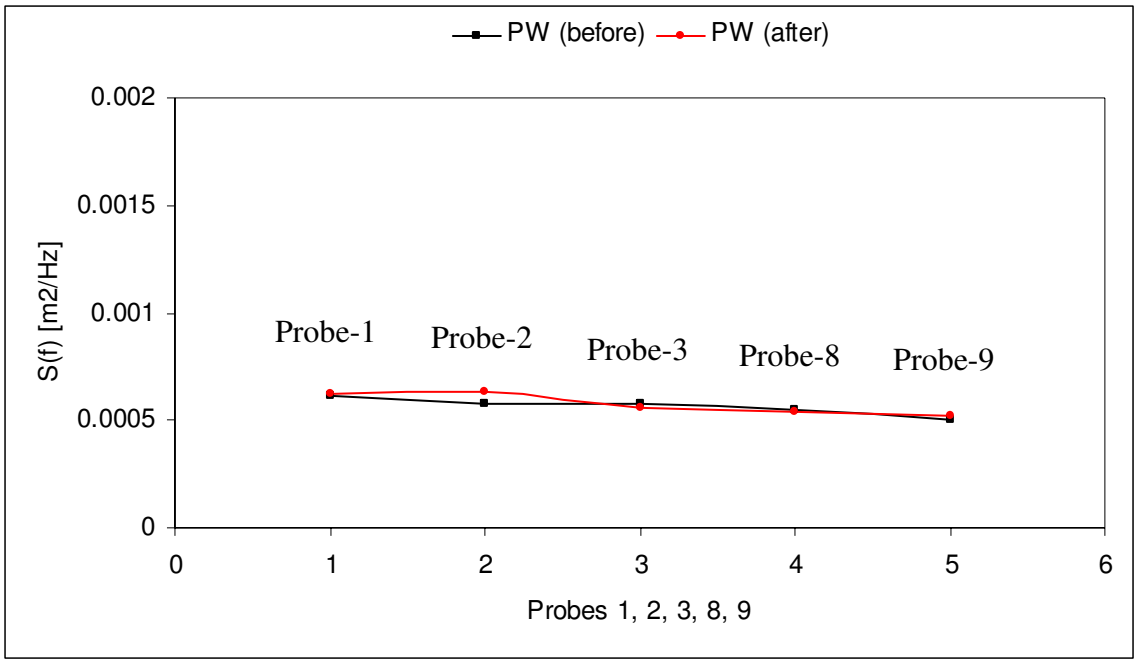

Fig. 50*g*: Along-tank energy distribution for isolated principal waves
B8-1: BIP8_H0P06_T1P0_T0P9

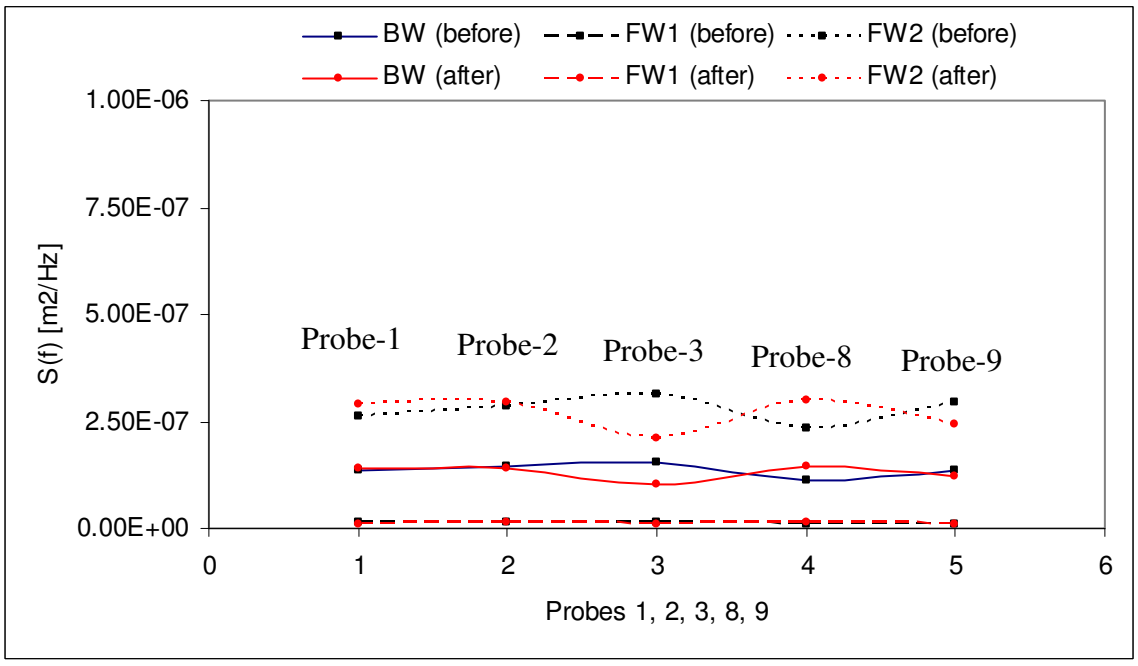

Fig. 50*h*: Along-tank energy distribution for isolated second-order waves
B8-1: BIP8_H0P06_T1P0_T0P9

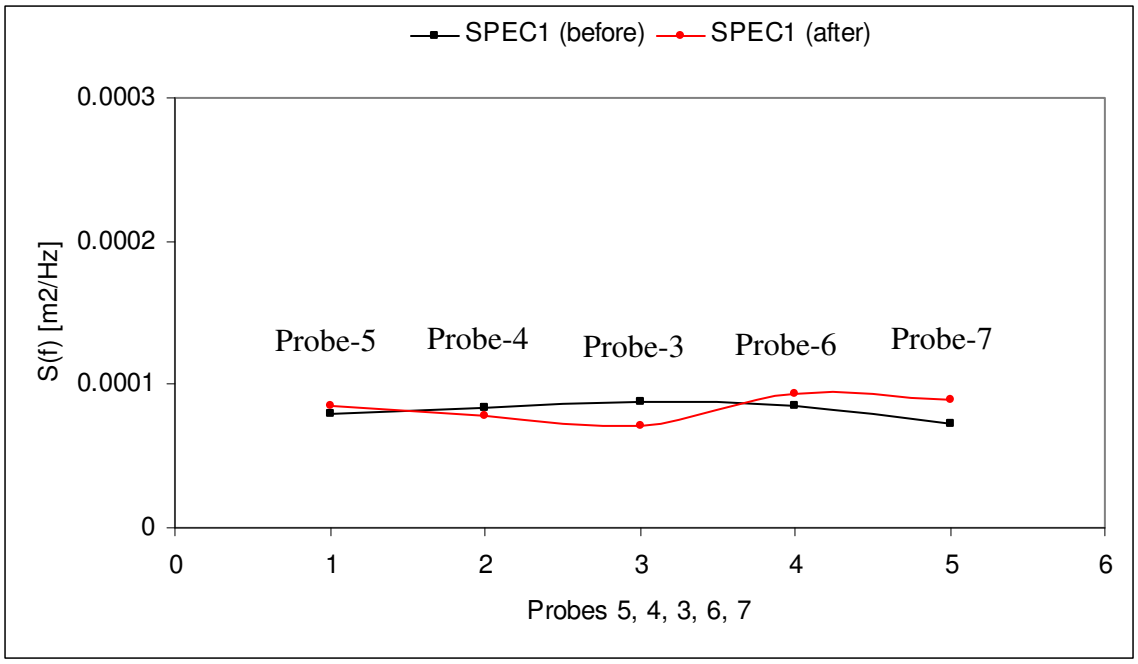

Fig. 51*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-2: BIP8_H0P02_T1P55_T1P45

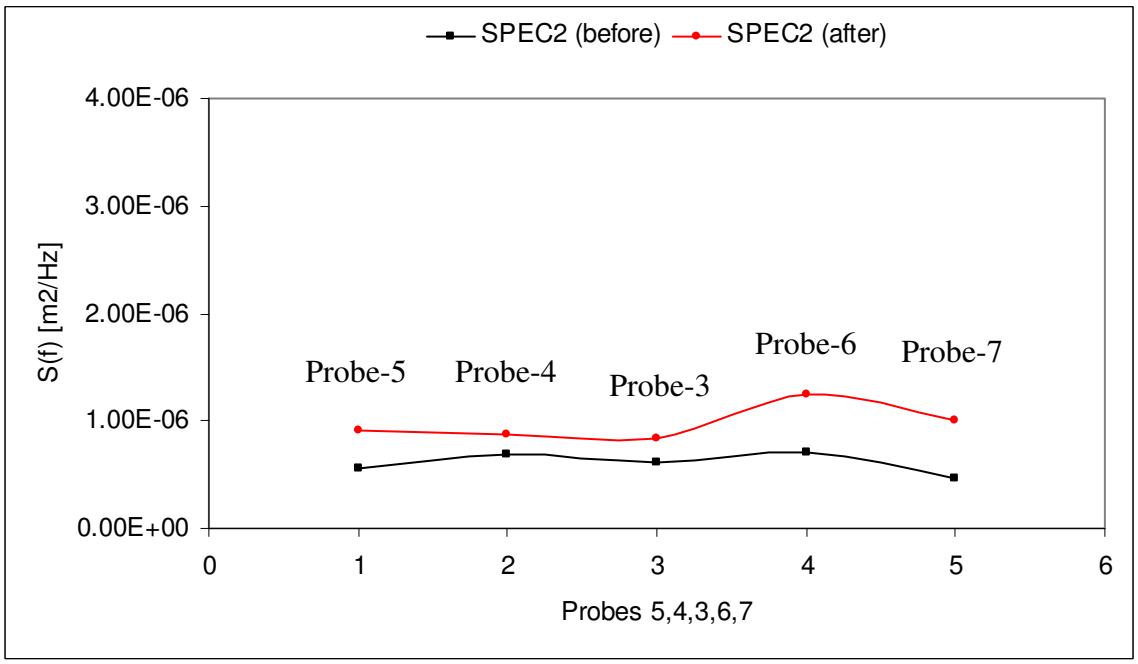

Fig. 51*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-2: BIP8_H0P02_T1P55_T1P45

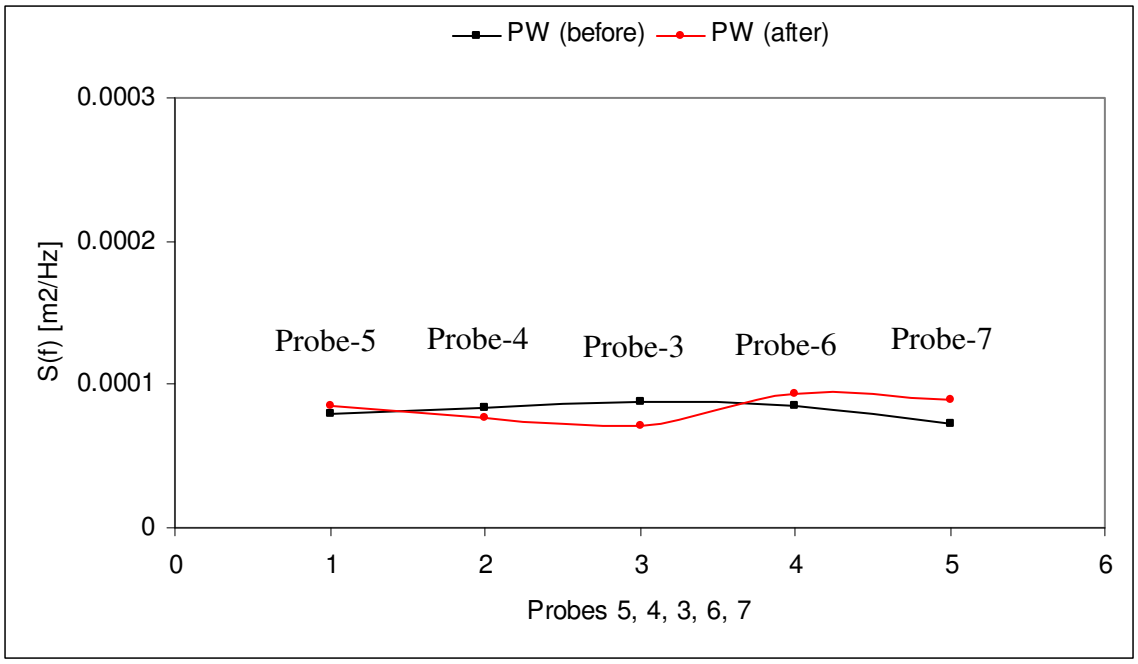

Fig. 51*c*: Cross-tank energy distribution for isolated principal waves
B8-2: BIP8_H0P02_T1P55_T1P45

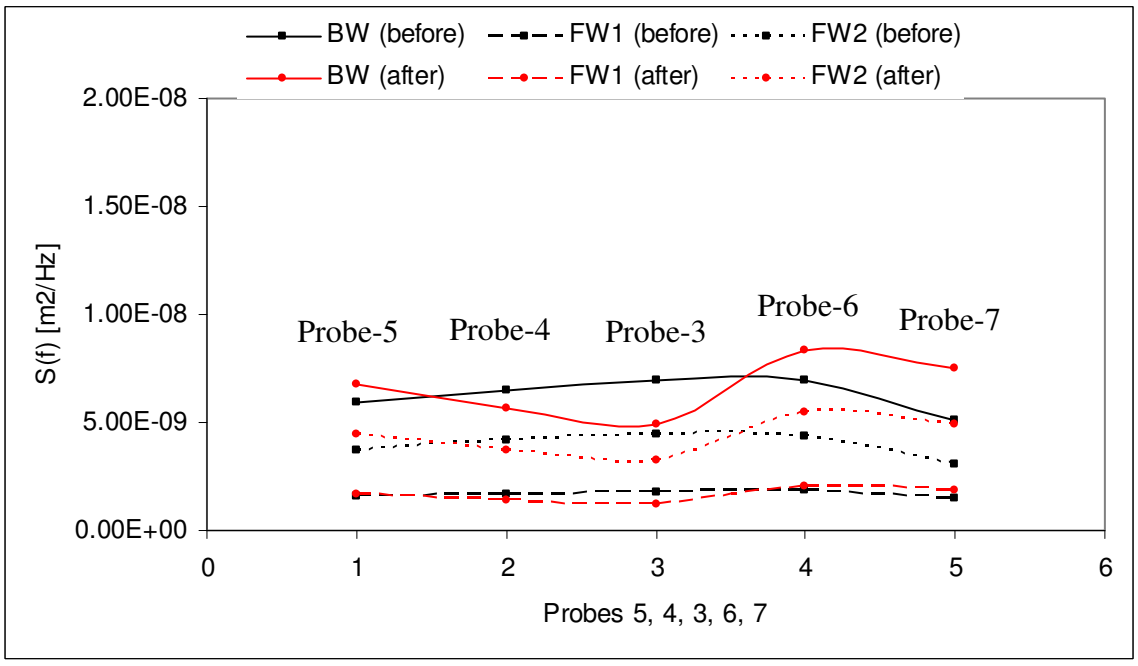

Fig. 51*d*: Cross-tank energy distribution for isolated second-order waves
B8-2: BIP8_H0P02_T1P55_T1P45

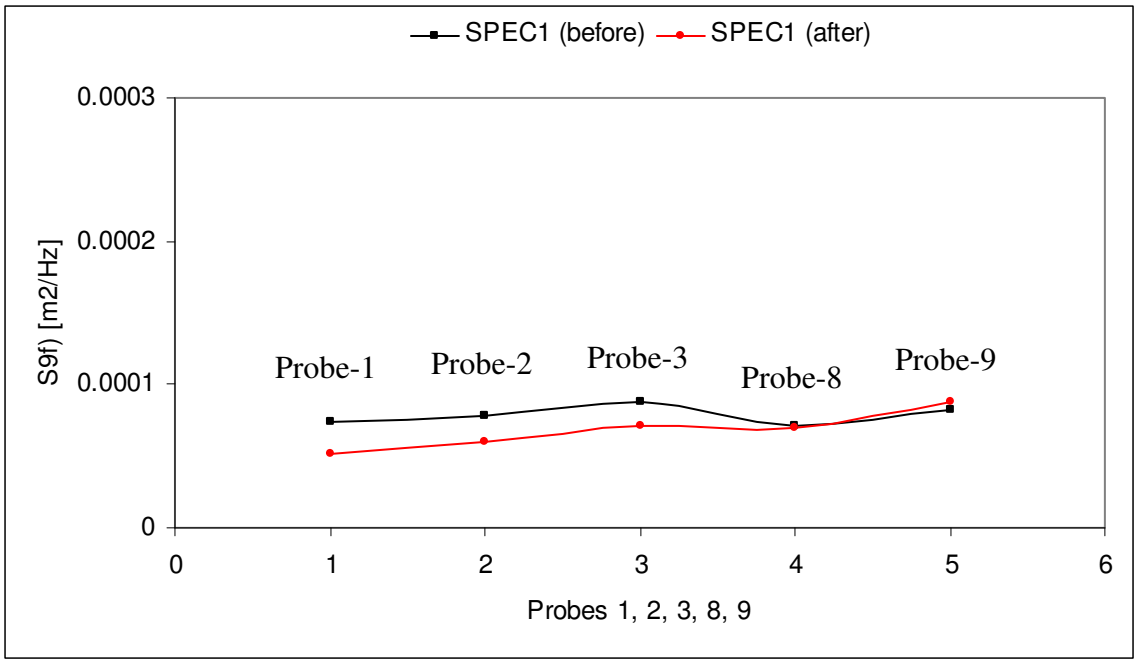

Fig. 51*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-2: BIP8_H0P02_T1P55_T1P45

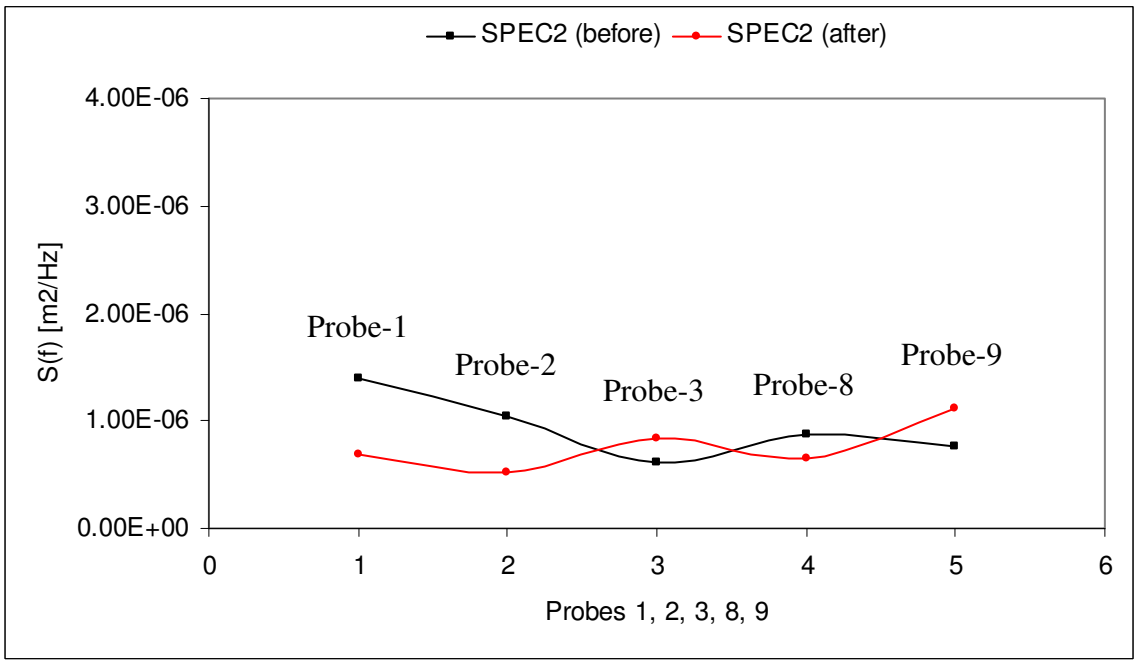

Fig. 51*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-2: BIP8_H0P02_T1P55_T1P45

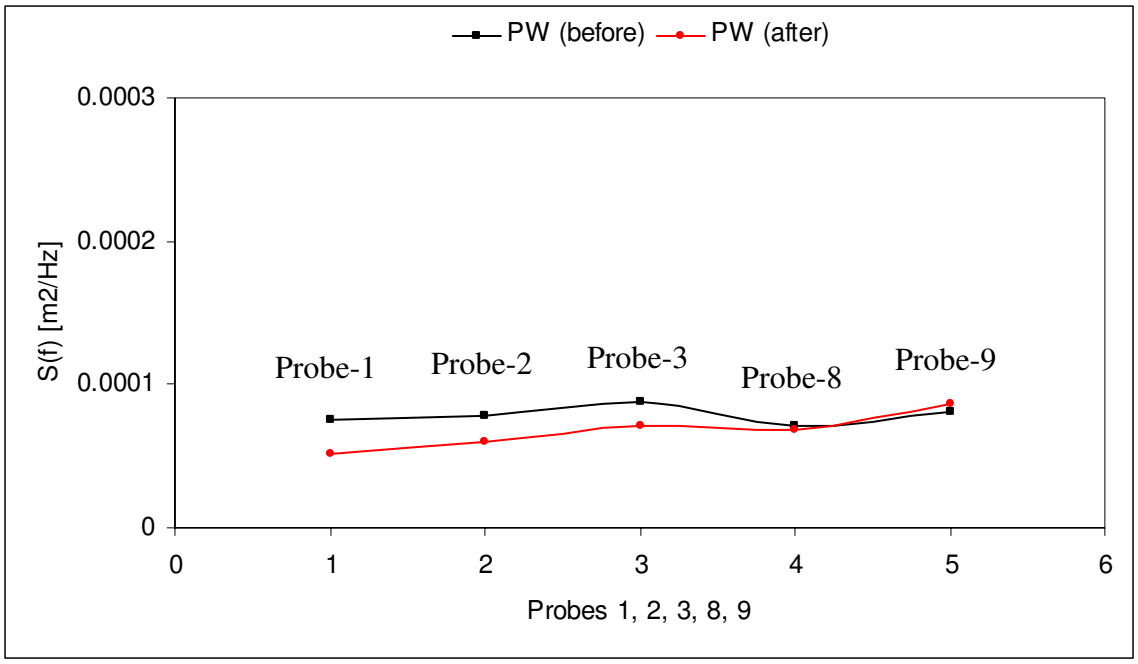

Fig. 51*g*: Along-tank energy distribution for isolated principal waves
B8-2: BIP8_H0P02_T1P55_T1P45

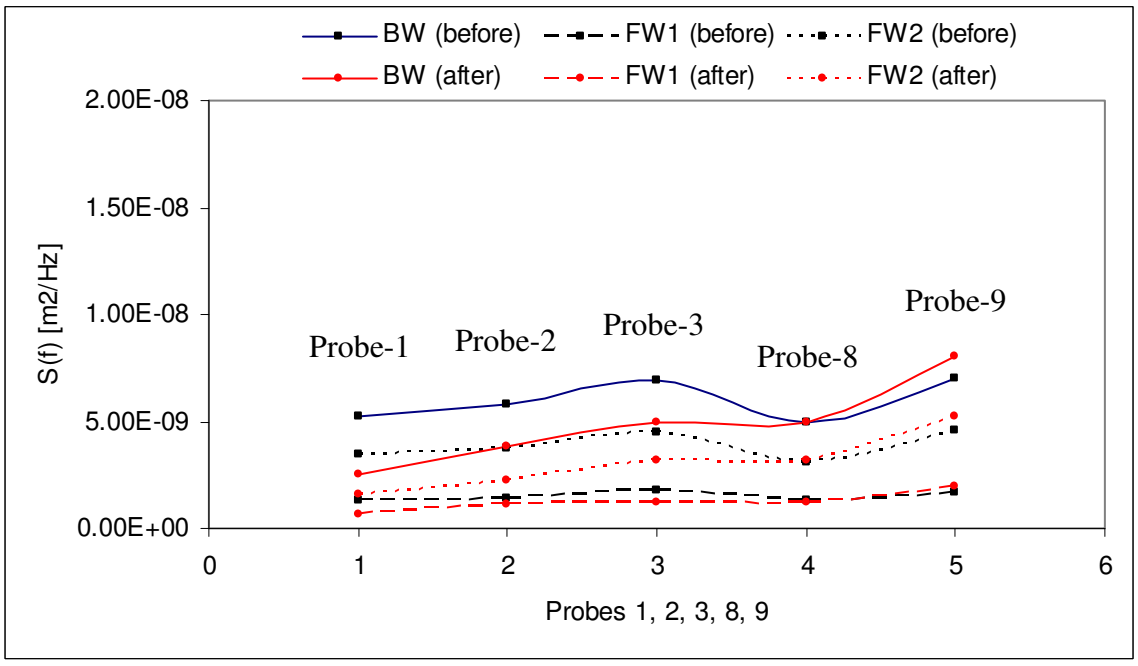

Fig. 51*h*: Along Along-tank energy distribution for isolated second-order waves
B8-2: BIP8_H0P02_T1P55_T1P45

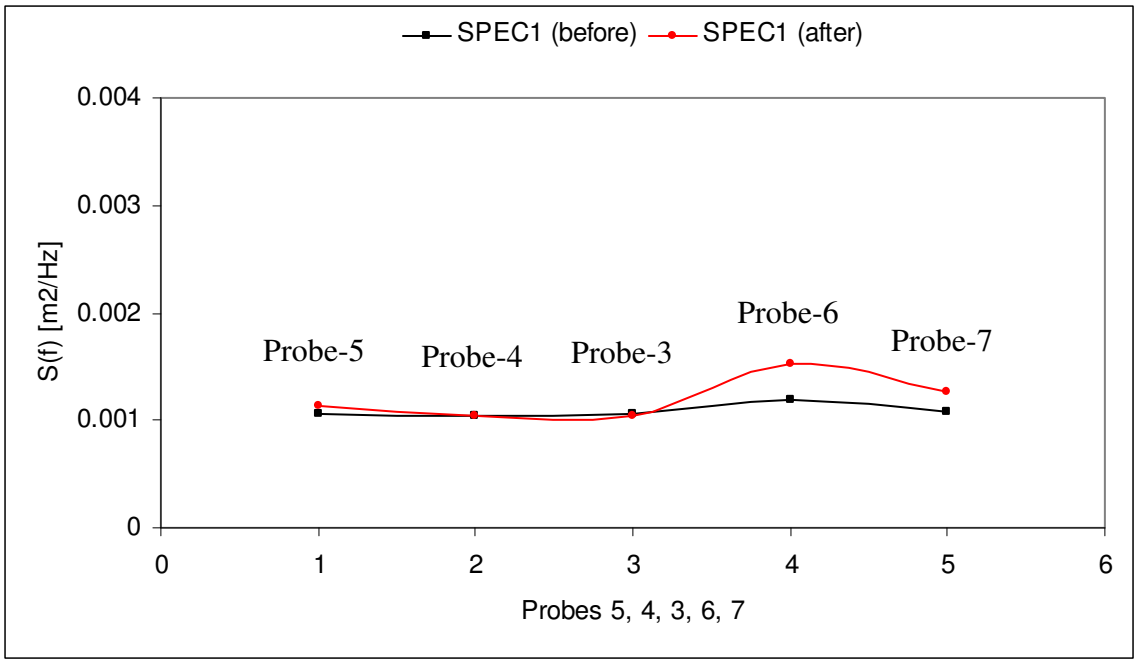

Fig. 52*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-3: BIP8_H0P08_T1P55_T1P45

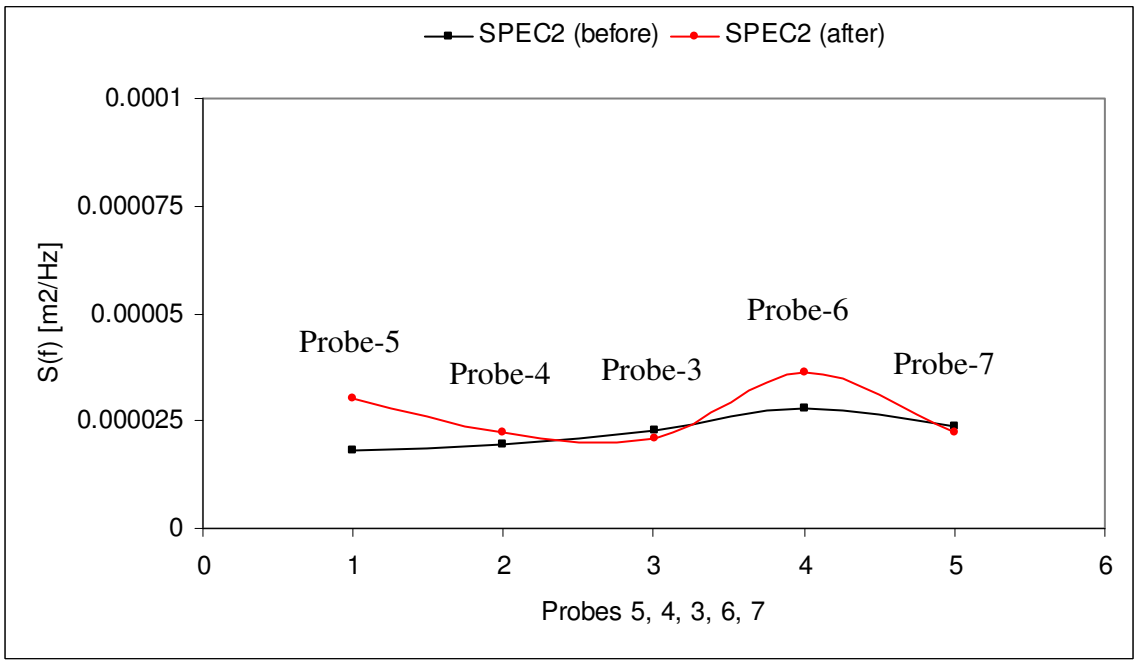

Fig. 52*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-3: BIP8_H0P08_T1P55_T1P45

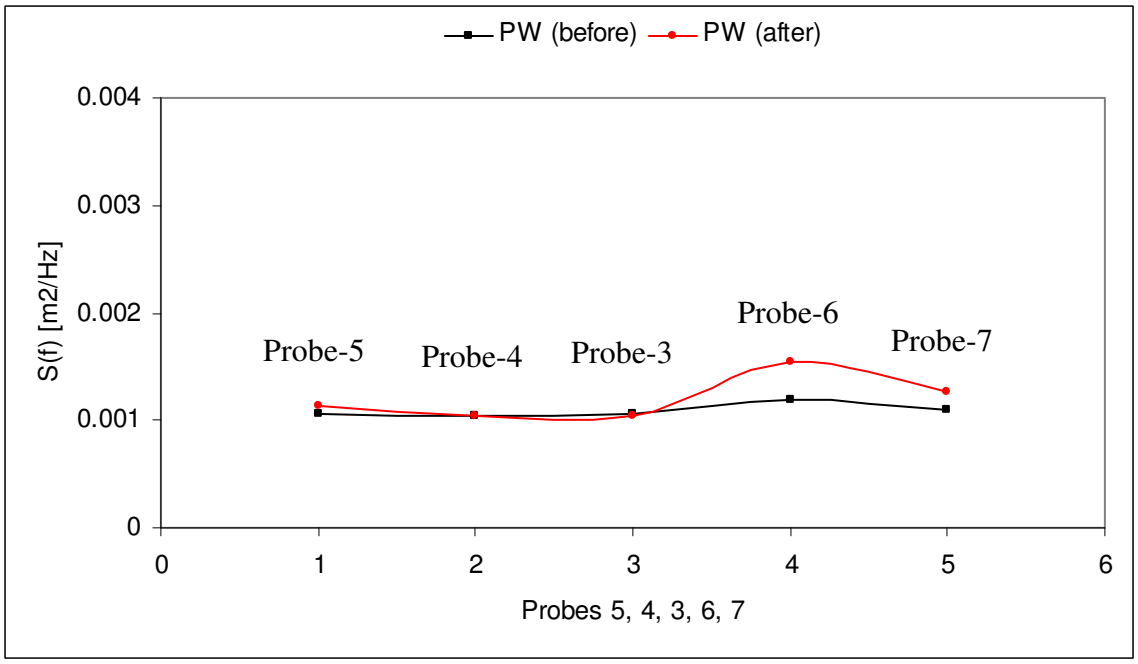

Fig. 52*c*: Cross-tank energy distribution for isolated principal waves
B8-3: BIP8_H0P08_T1P55_T1P45

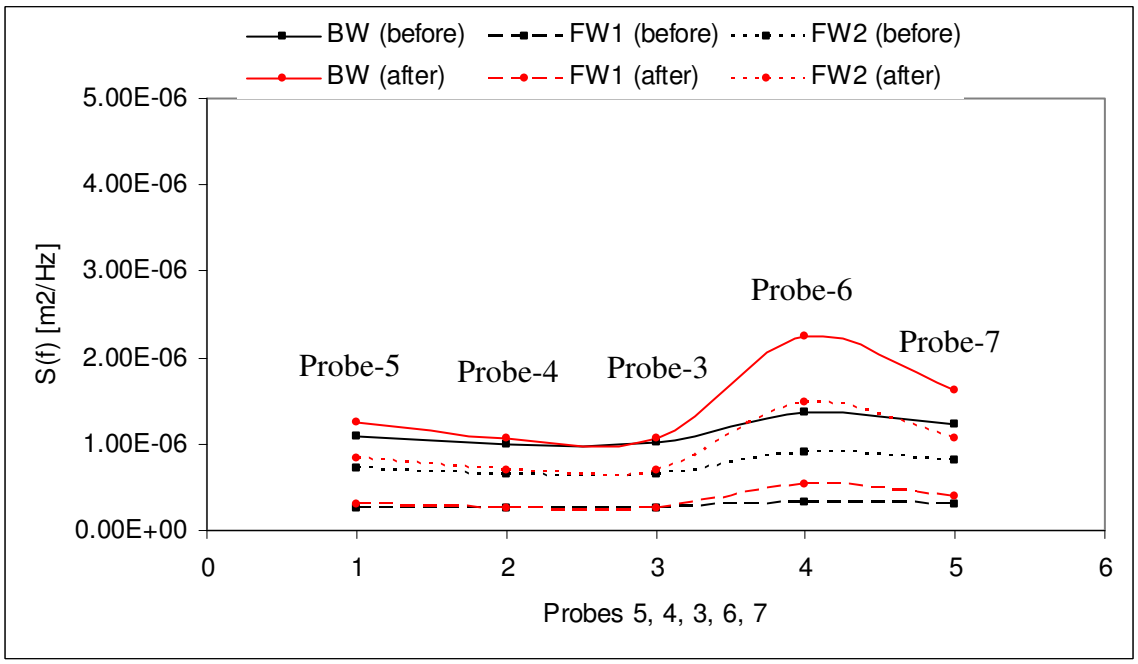

Fig. 52*d*: Cross-tank energy distribution for isolated second-order waves
B8-3: BIP8_H0P08_T1P55_T1P45

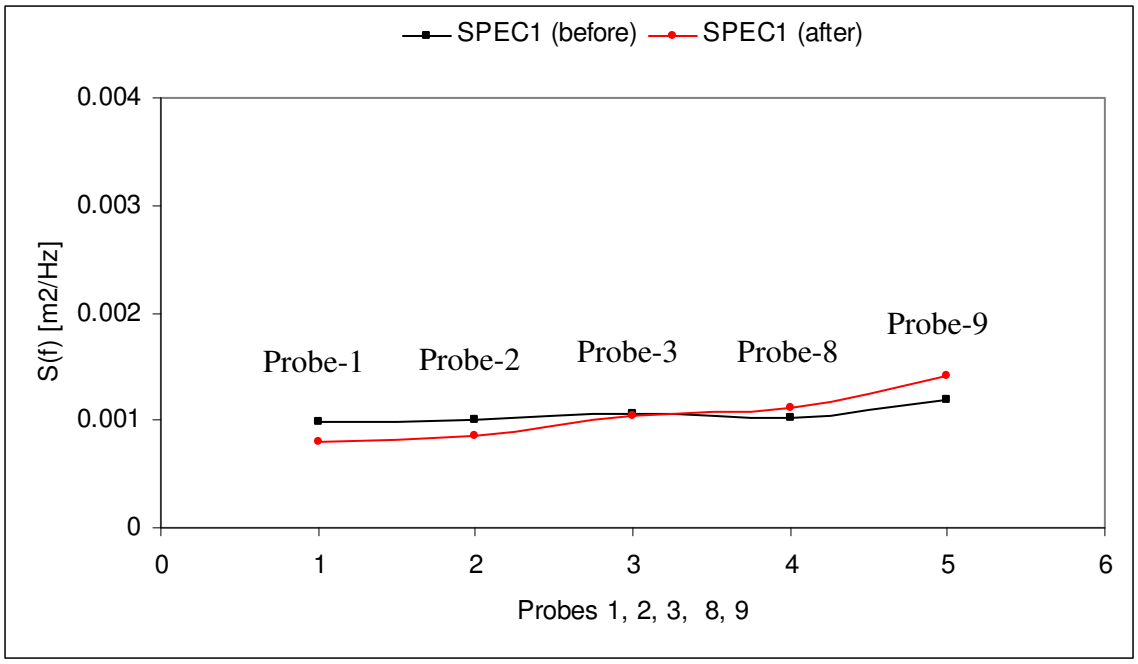

Fig. 52*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-3: BIP8_H0P08_T1P55_T1P45

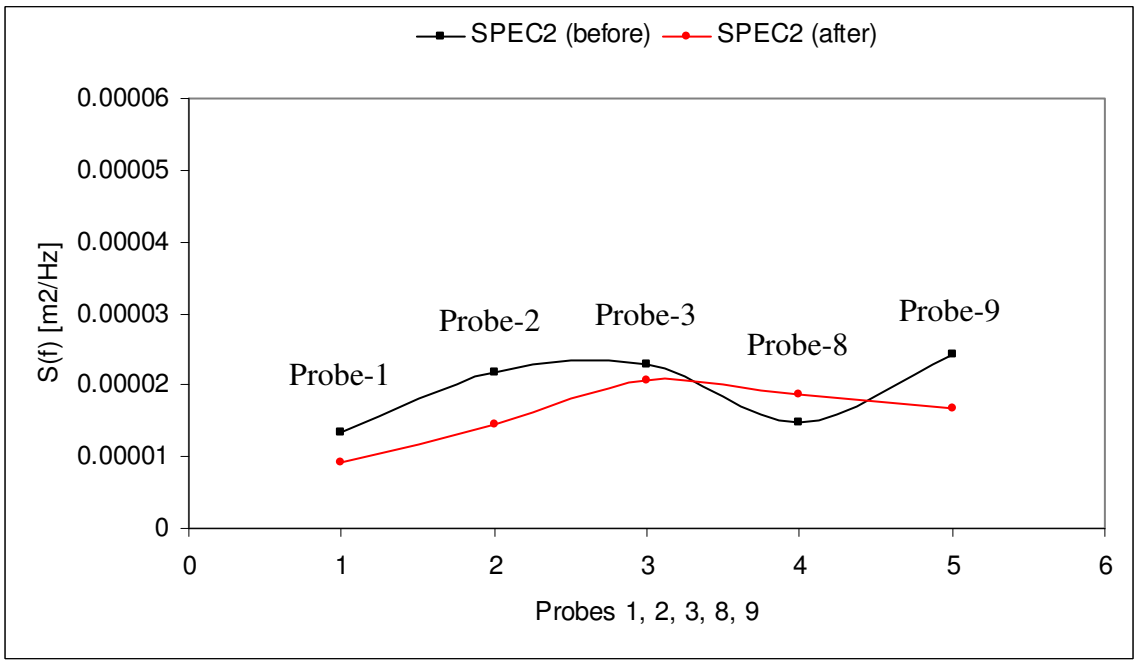

Fig. 52*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-3: BIP8_H0P08_T1P55_T1P45

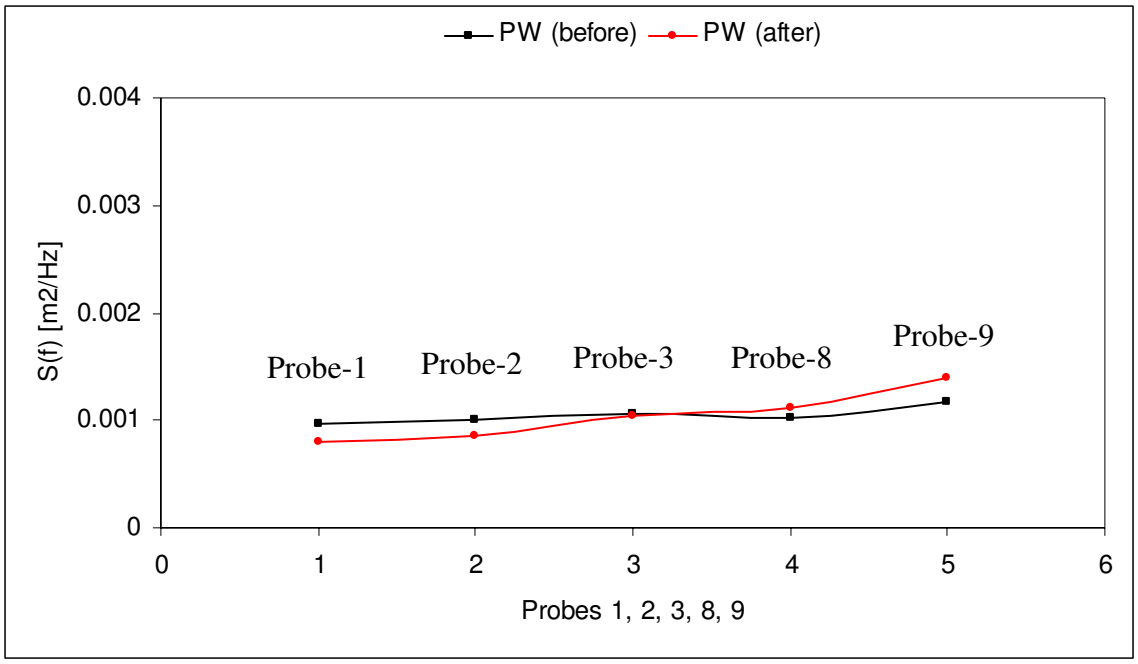

Fig. 52*g*: Along-tank energy distribution for isolated principal waves
B8-3: BIP8_H0P08_T1P55_T1P45

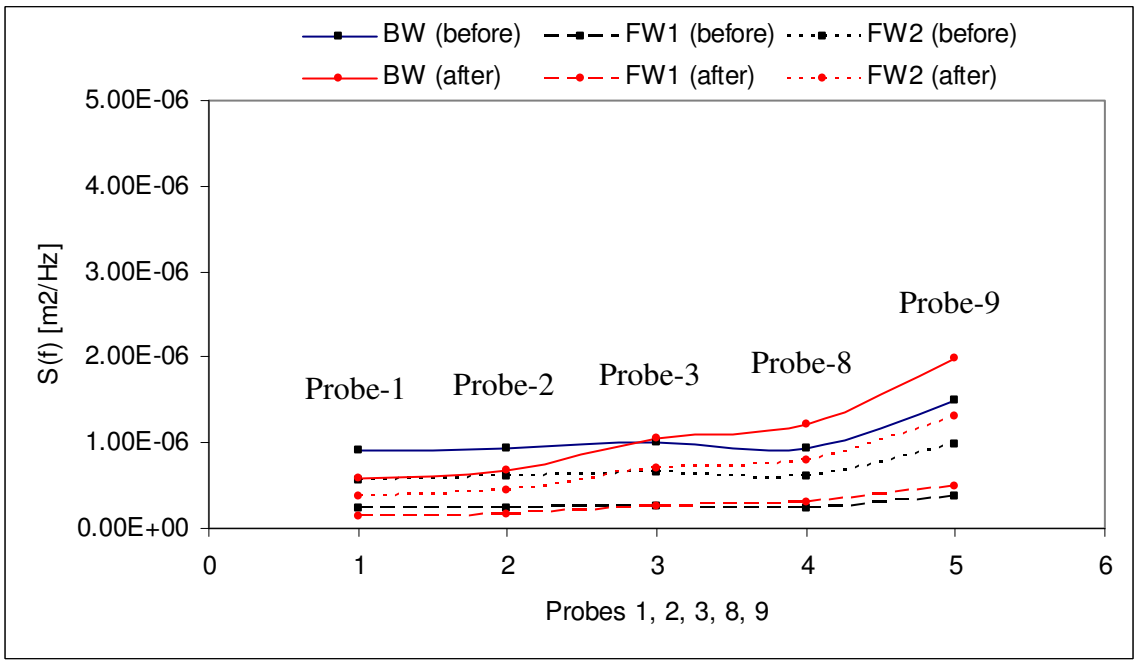

Fig. 52*h*: Along-tank energy distribution for isolated second-order waves
B8-3: BIP8_H0P08_T1P55_T1P45

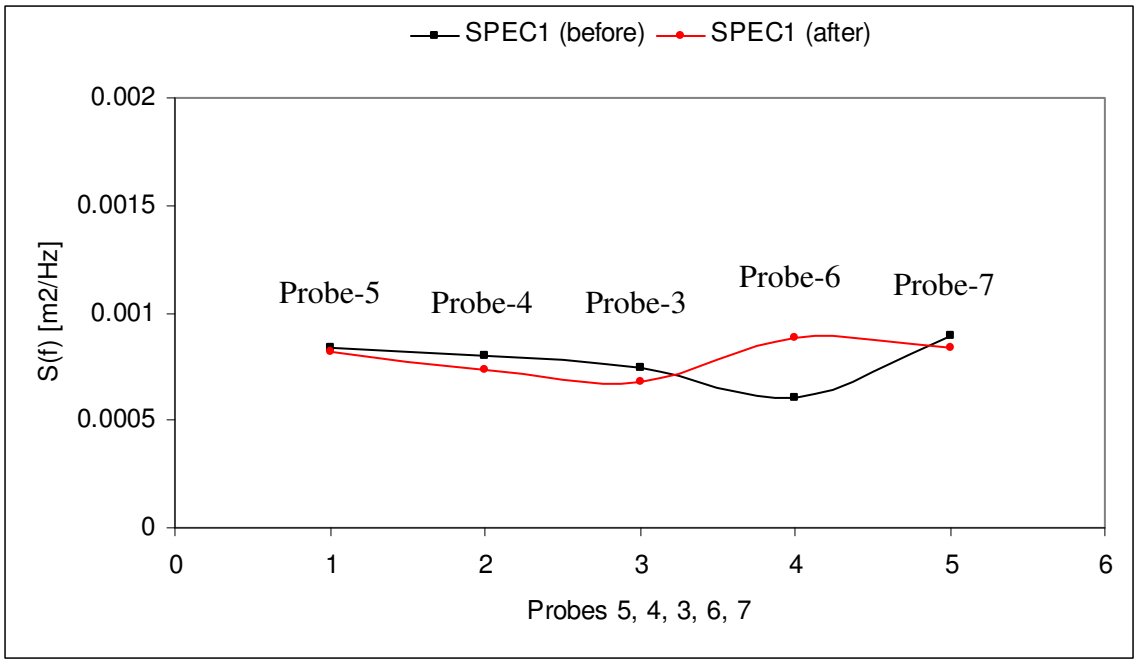

Fig. 53*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-4: BIP8_H0P06_T2P12_T2P02

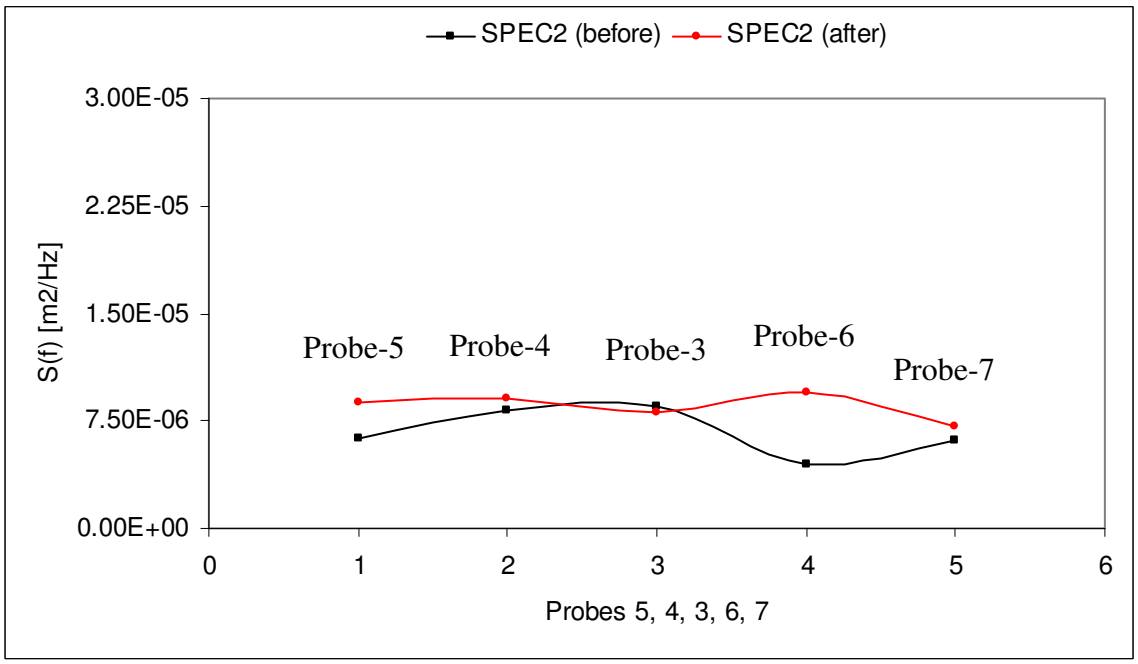

Fig. 53*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-4: BIP8_H0P06_T2P12_T2P02

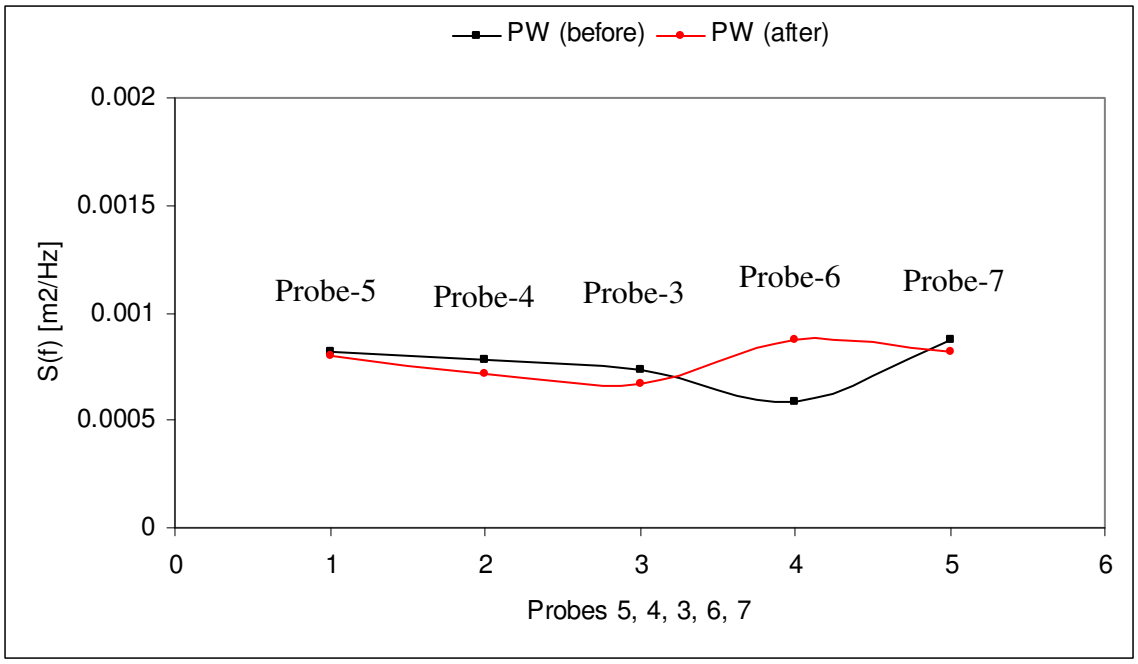

Fig. 53*c*: Cross-tank energy distribution for isolated principal waves
B8-4: BIP8_H0P06_T2P12_T2P02

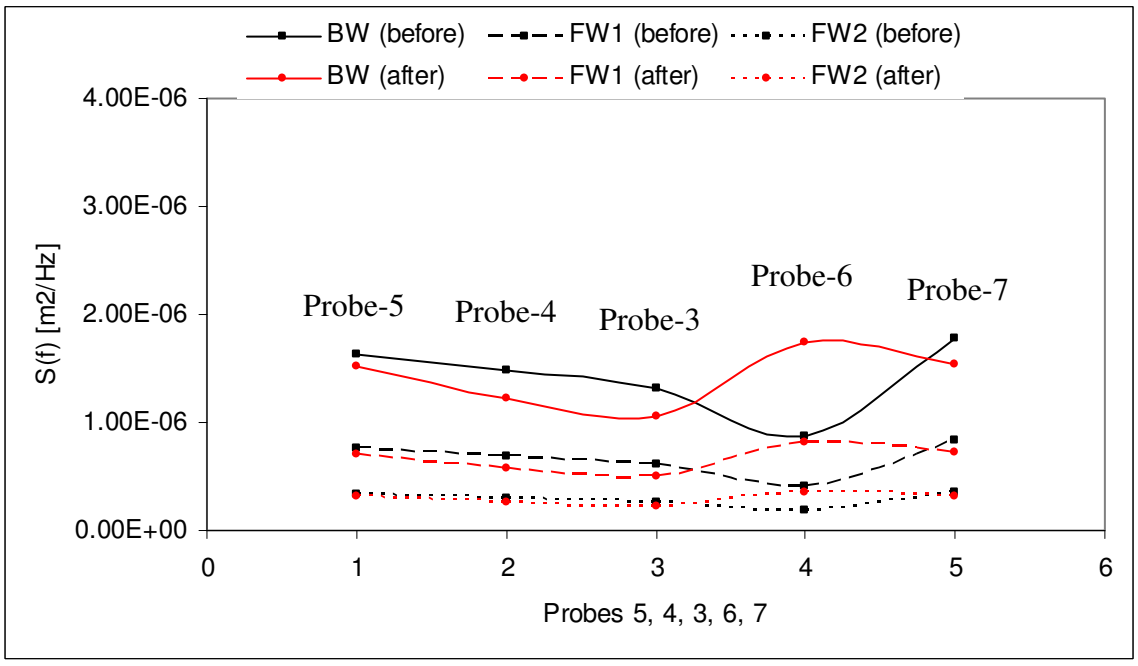

Fig. 53*d*: Cross-tank energy distribution for isolated second-order waves
B8-4: BIP8_H0P06_T2P12_T2P02

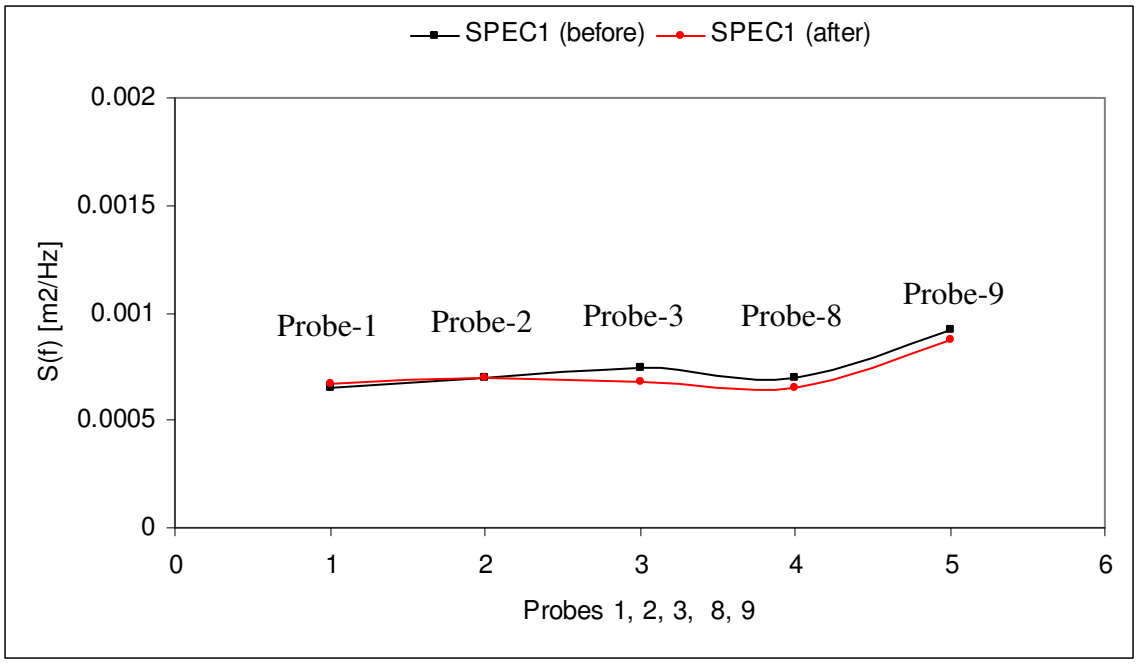

Fig. 53*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-4: BIP8_H0P06_T2P12_T2P02

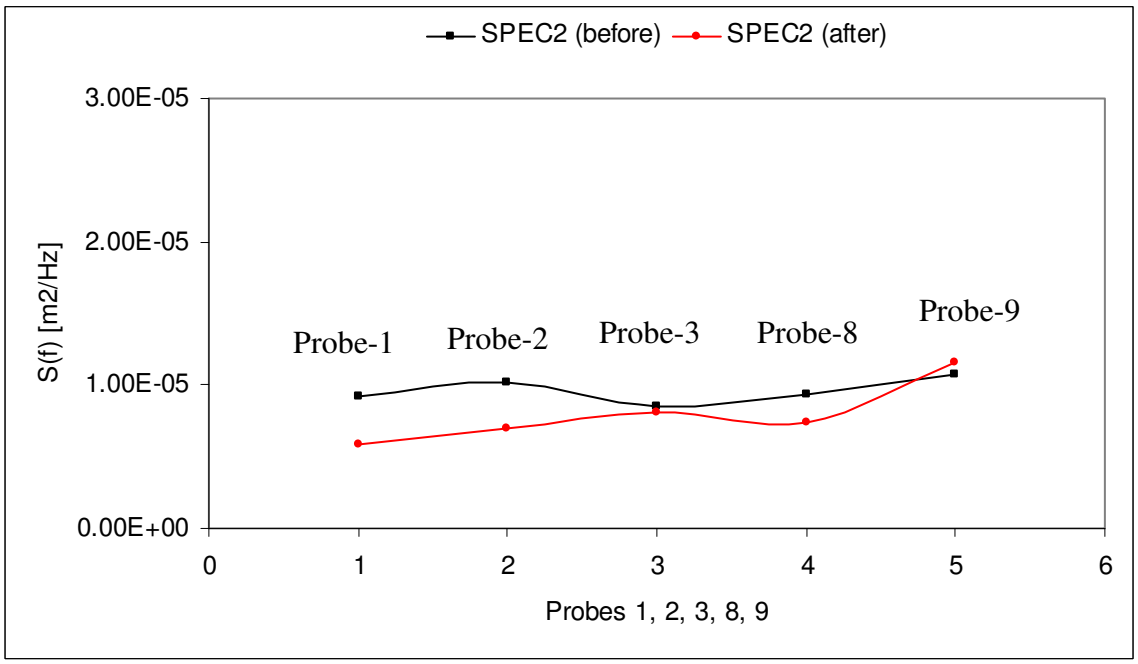

Fig. 53*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-4: BIP8_H0P06_T2P12_T2P02

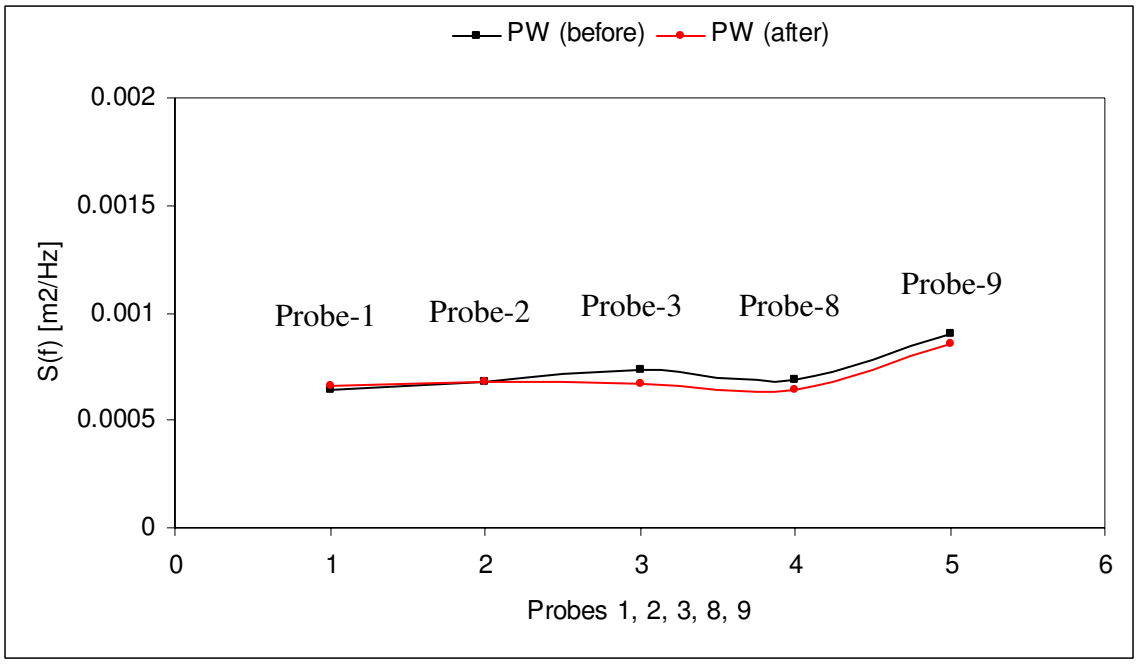

Fig. 53*g*: Along-tank energy distribution for isolated principal waves
B8-4: BIP8_H0P06_T2P12_T2P02

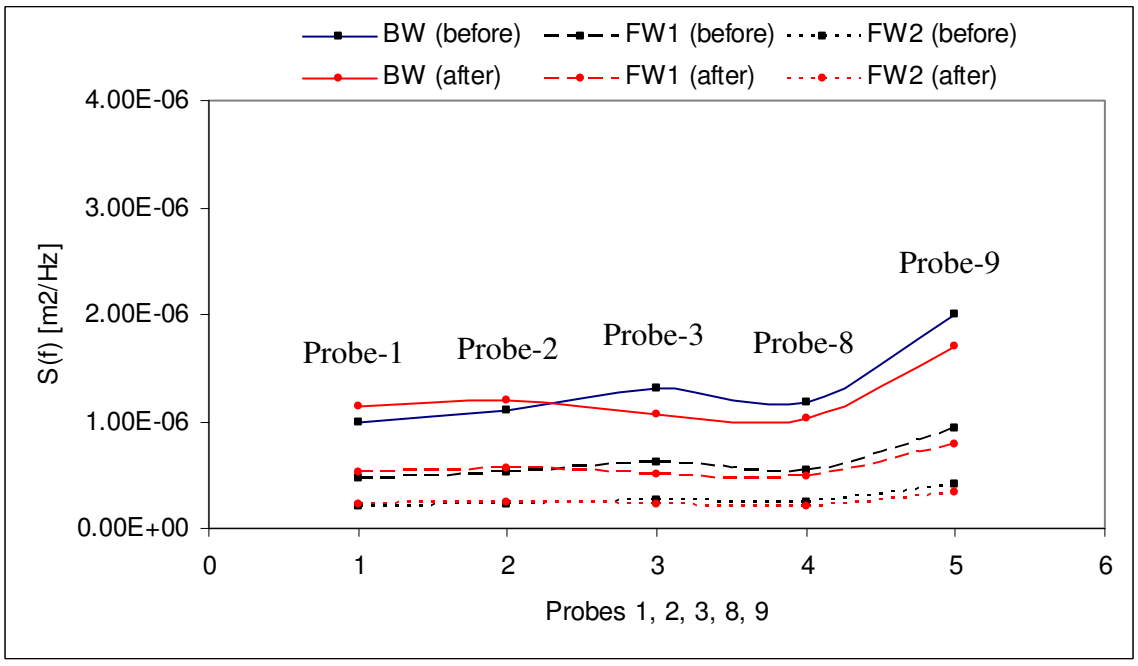

Fig. 53*h*: Along-tank energy distribution for isolated second-order waves
B8-4: BIP8_H0P06_T2P12_T2P02

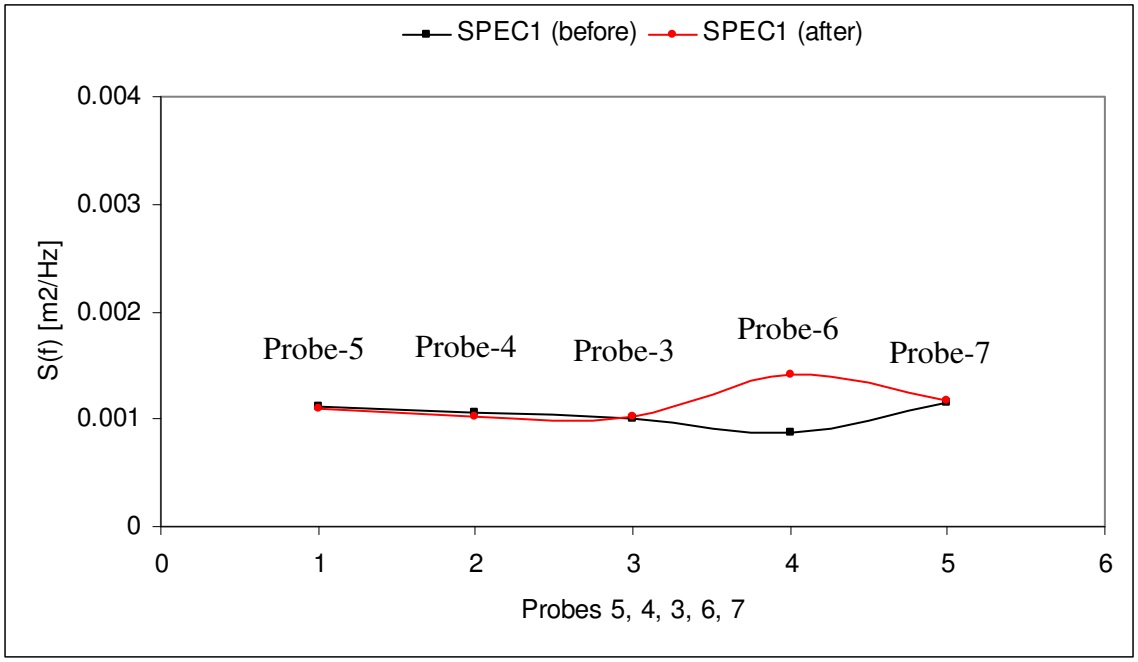

Fig. 54*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-5: BIP8_H0P08_T2P22_T2P0

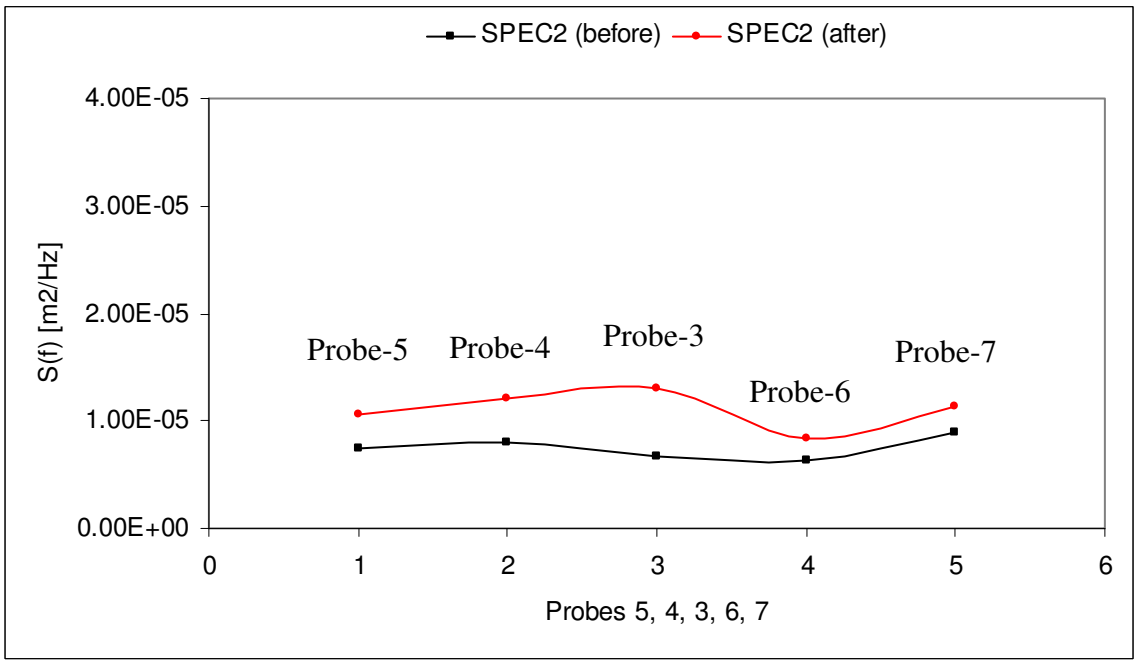

Fig. 54*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-5: BIP8_H0P08_T2P22_T2P0

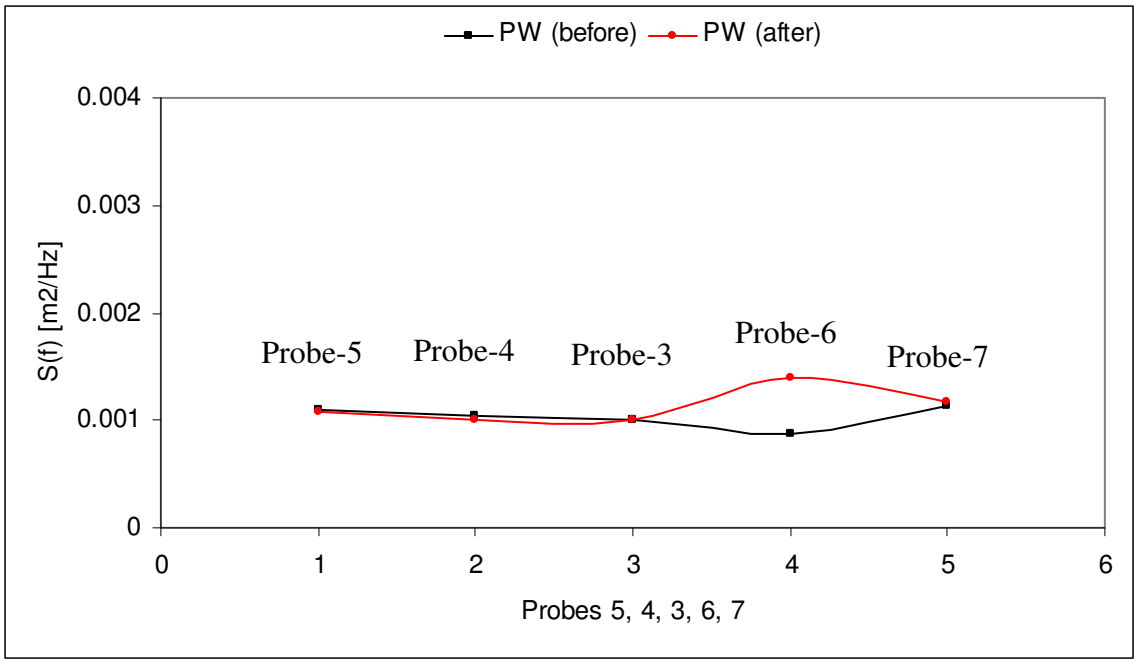

Fig. 54*c*: Cross-tank energy distribution for isolated principal waves
B8-5: BIP8_H0P08_T2P22_T2P0

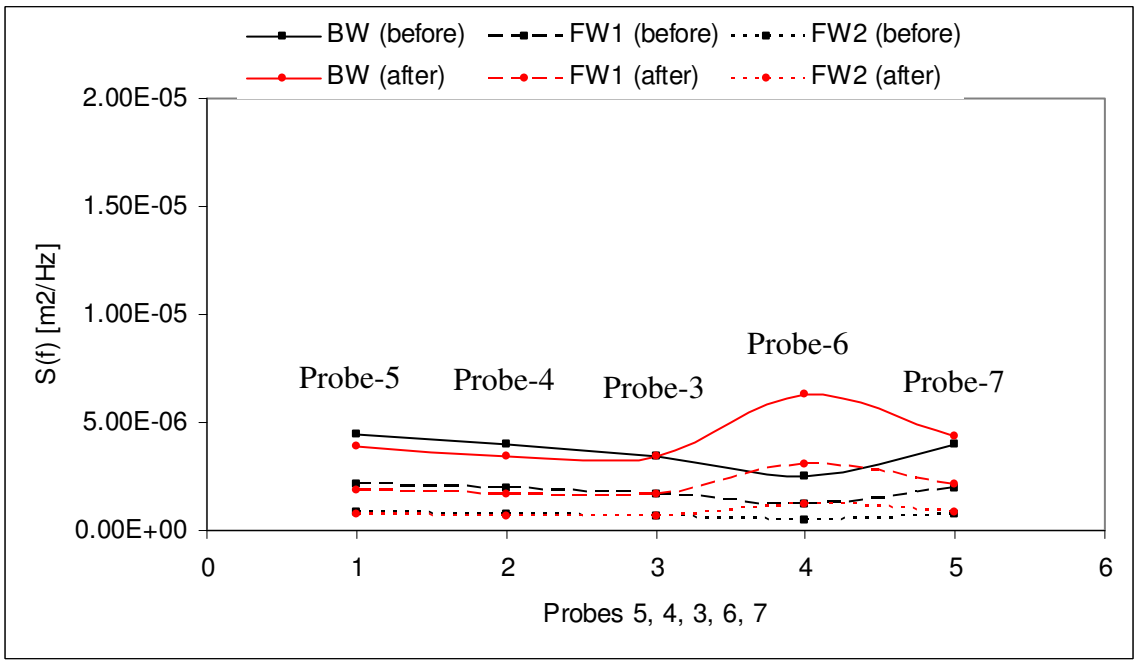

Fig. 54*d*: Cross-tank energy distribution for isolated second-order waves
B8-5: BIP8_H0P08_T2P22_T2P0

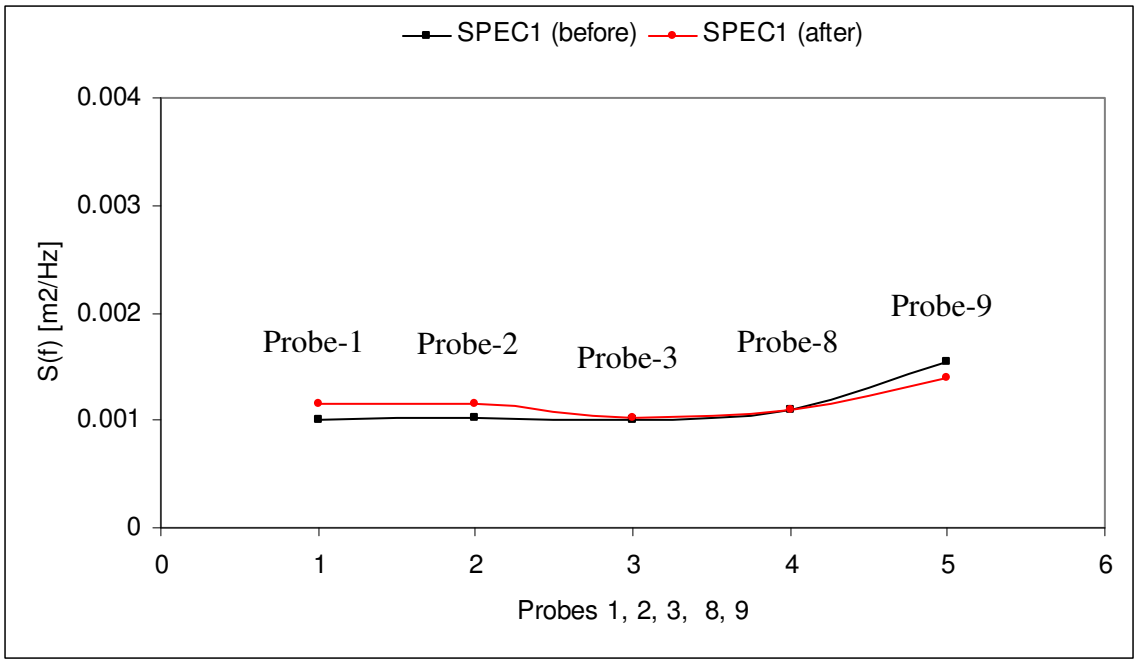

Fig. 54*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-5: BIP8_H0P08_T2P22_T2P0

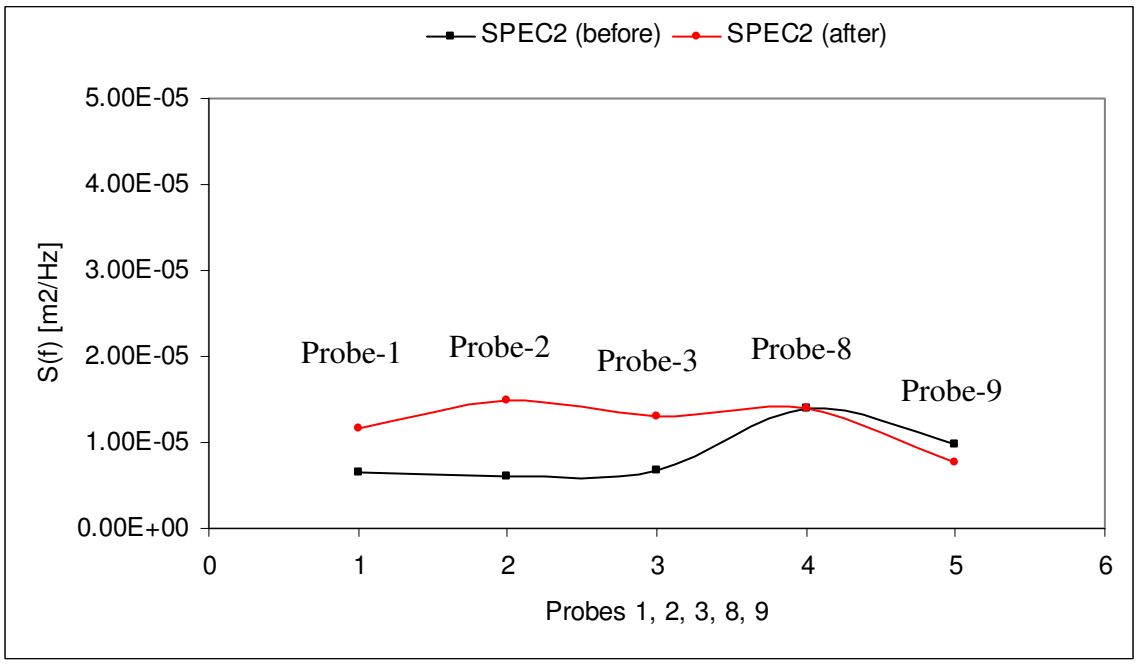

Fig. 54*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-5: BIP8_H0P08_T2P22_T2P0

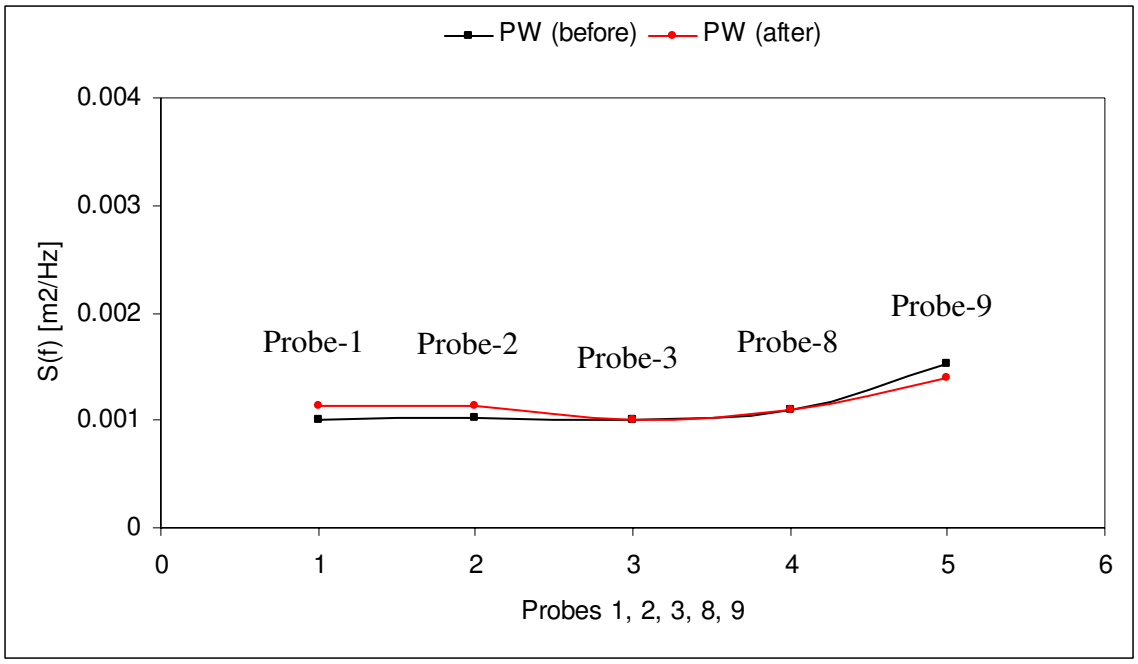

Fig. 54*g*: Along-tank energy distribution for isolated principal waves
B8-5: BIP8_H0P08_T2P22_T2P0

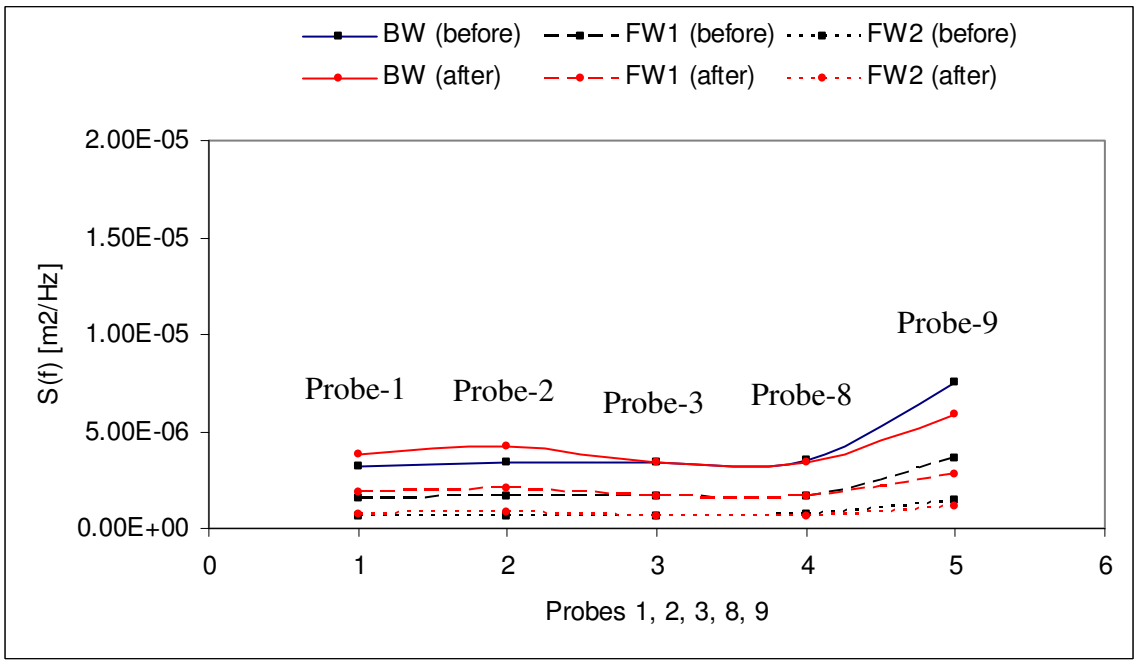

Fig. 54*h*: Along-tank energy distribution for isolated second-order waves
B8-5: BIP8_H0P08_T2P22_T2P0

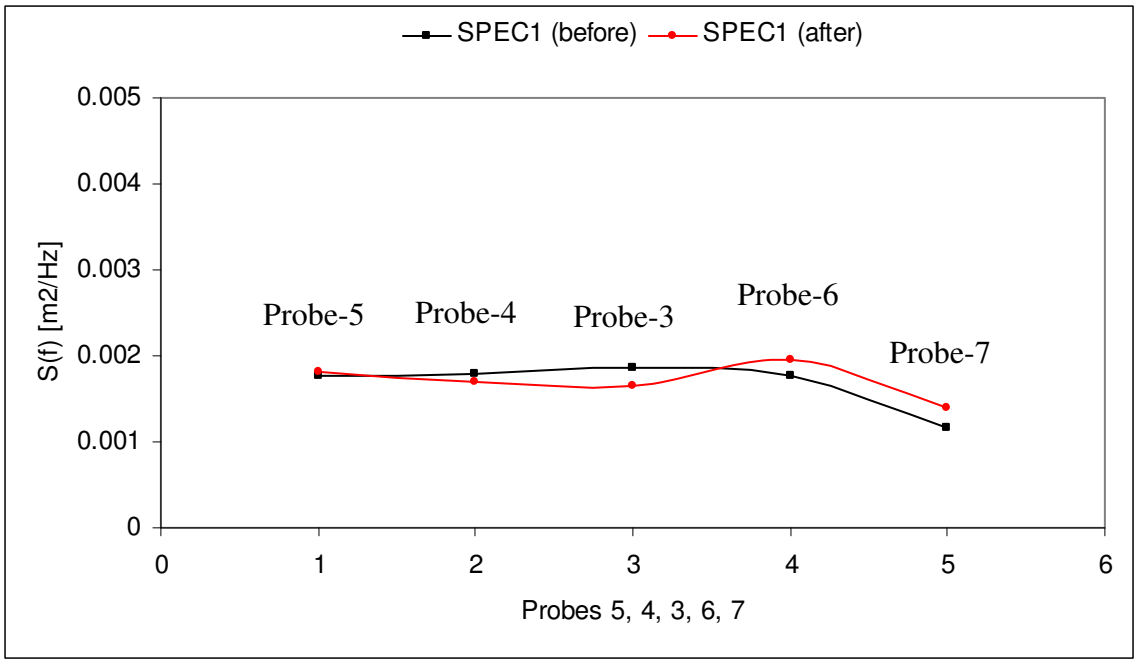

Fig. 55*a*: Cross-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-6: BIP8_H0P08_T3P33_T2P85

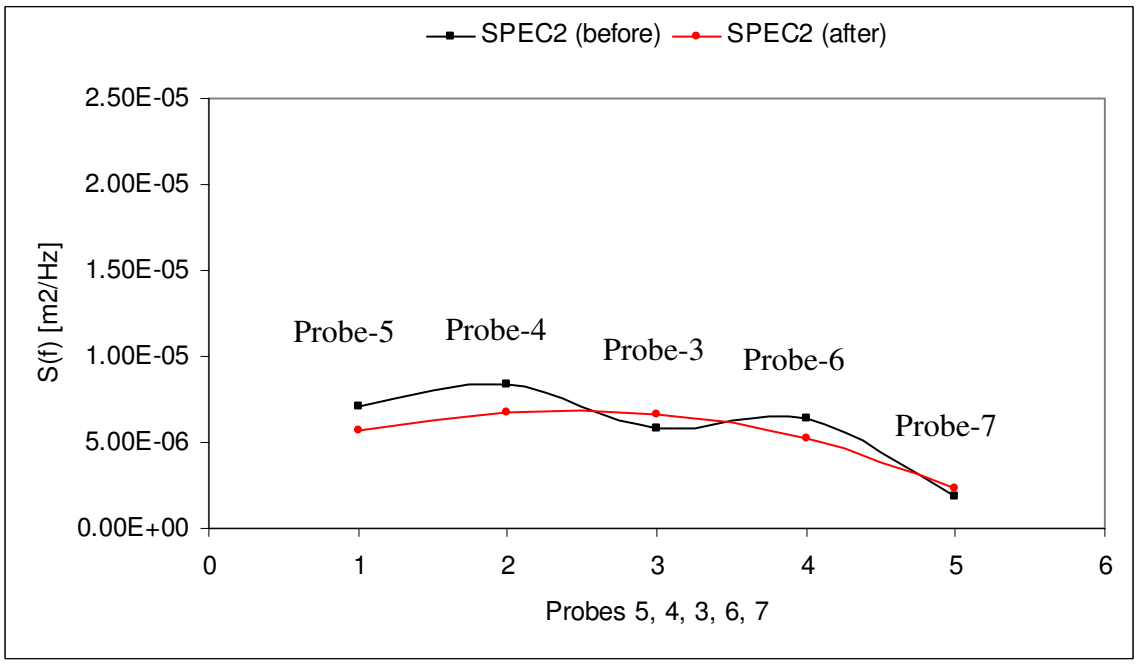

Fig. 55*b*: Cross-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-6: BIP8_H0P08_T3P33_T2P85

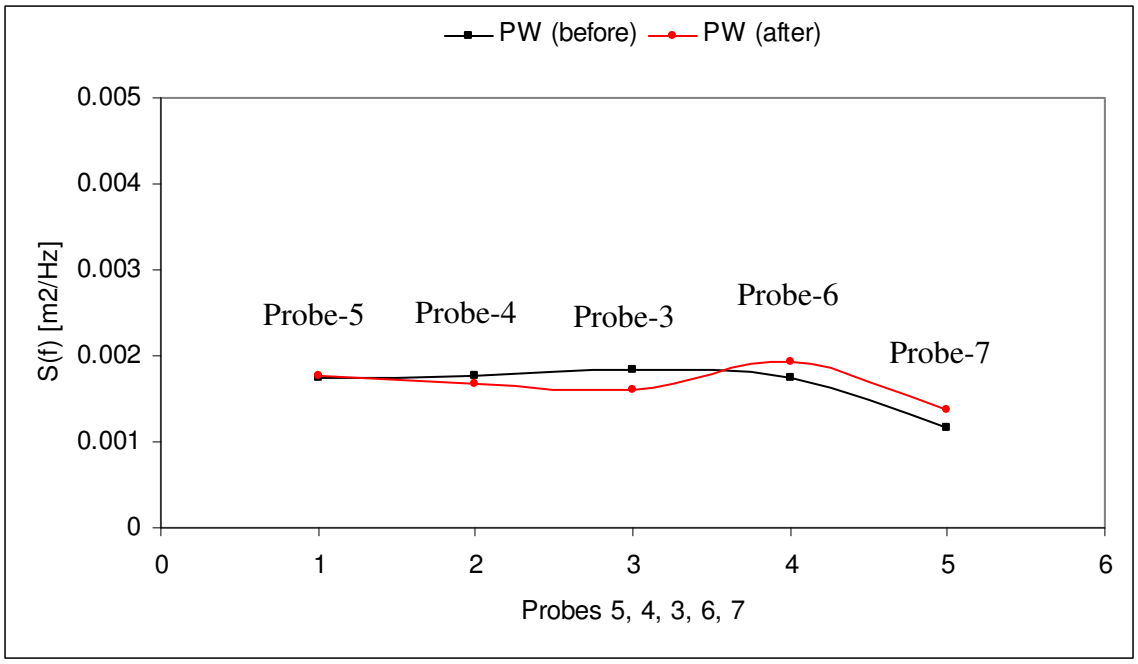

Fig. 55*c*: Cross-tank energy distribution for isolated principal waves
B8-6: BIP8_H0P08_T3P33_T2P85

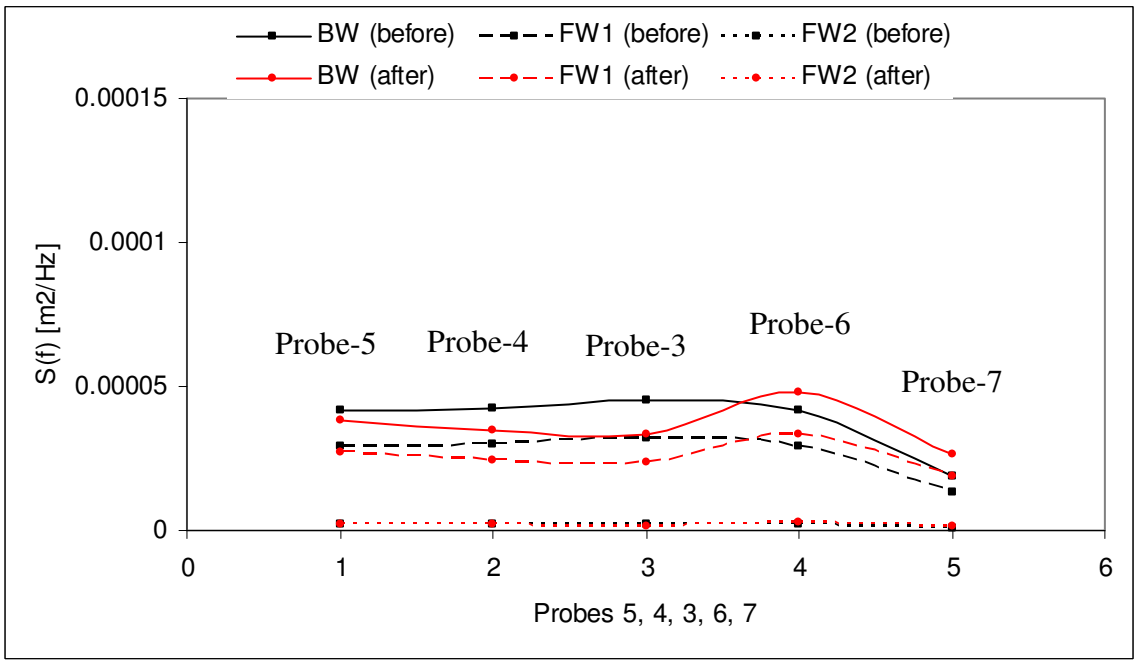

Fig. 55*d*: Cross-tank energy distribution for isolated second-order waves
B8-6: BIP8_H0P08_T3P33_T2P85

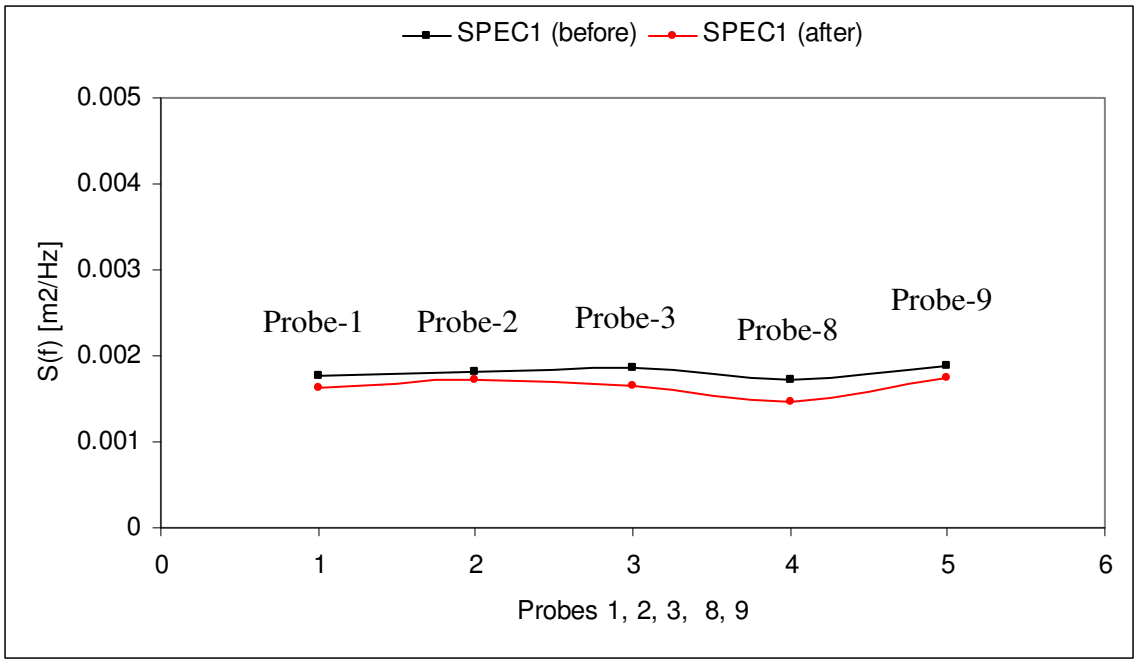

Fig. 55*e*: Along-tank energy distribution for measured waves (0 to 1.0 Hz)
B8-6: BIP8_H0P08_T3P33_T2P85

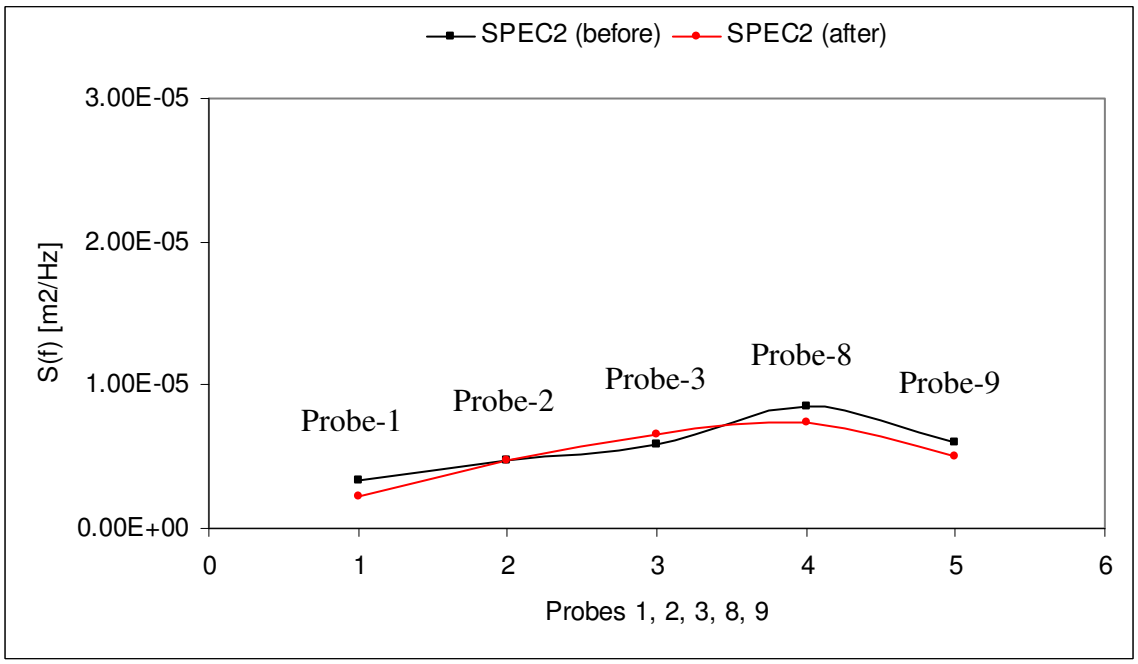

Fig. 55*f*: Along-tank energy distribution for measured waves (0.9 to 1.5 Hz)
B8-6: BIP8_H0P08_T3P33_T2P85

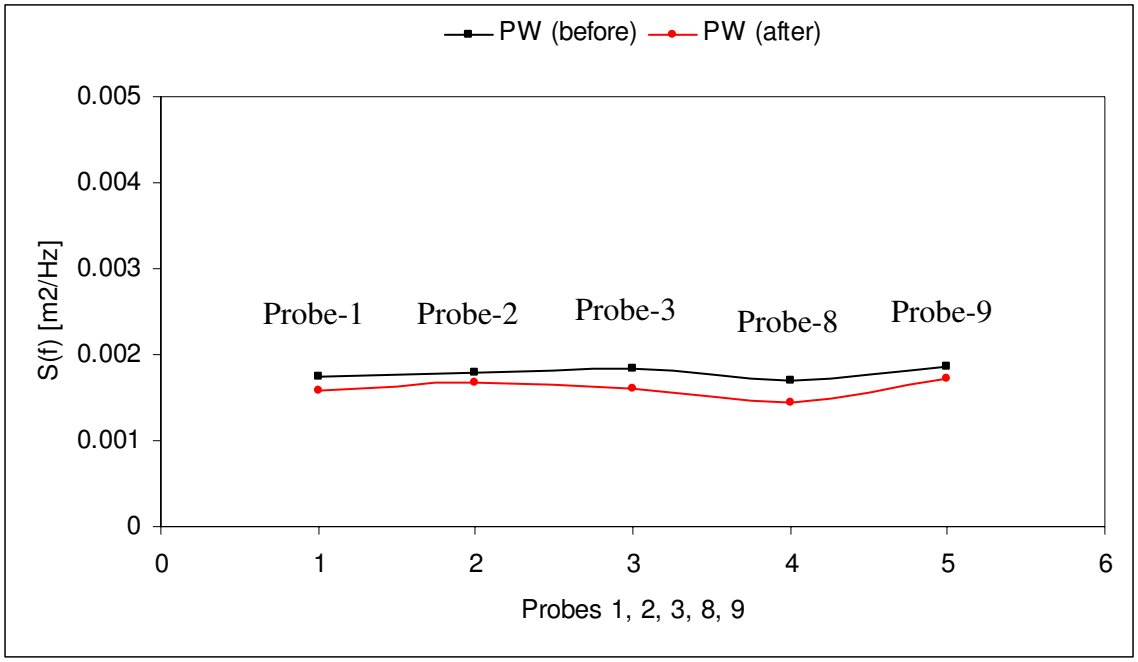

Fig. 55*g*: Along-tank energy distribution for isolated principal waves
B8-6: BIP8_H0P08_T3P33_T2P85

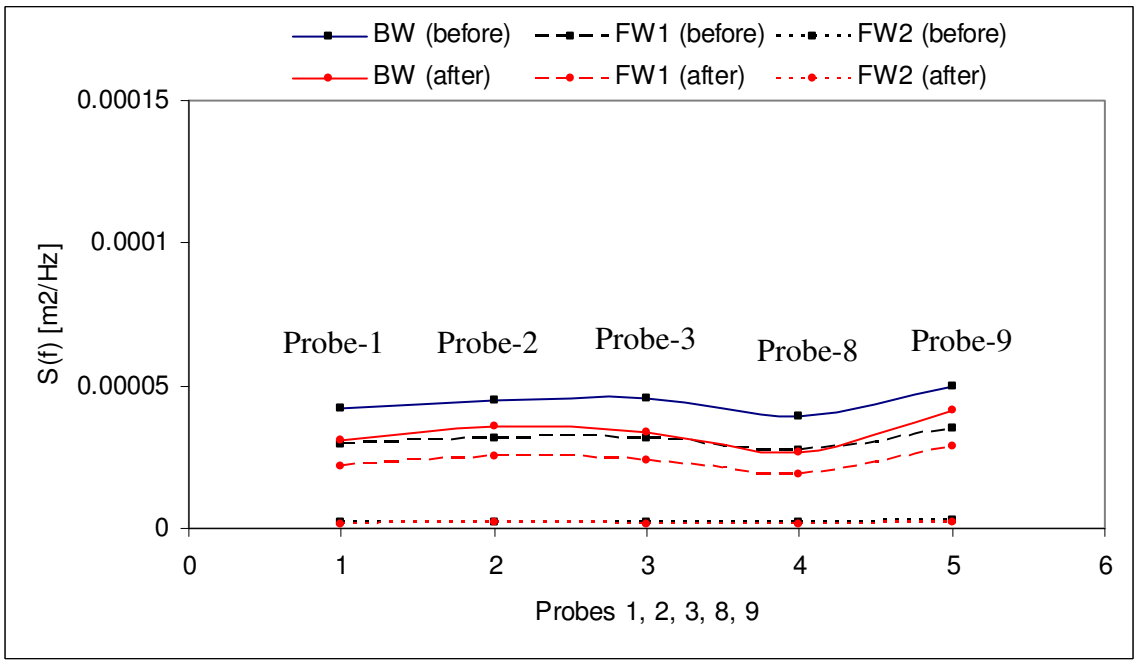

Fig. 55*h*: Along-tank energy distribution for isolated second-order waves
B8-6: BIP8_H0P08_T3P33_T2P85

Notes: