Case 3

Propeller Pressure Pulses in Oblique Flow

Content

3 Participants

The following institutes have participated:

Case 3.1

Group	Solver	Acronym	Cavitation	N / turn
Cradle	SCTetra	Cradle-SCTetra	without	512
Cradle	SCTetra	Cradle-SCTetra	with	1024
MARIN	ReFresco	MARIN-ReFresco	without	128
MARIN	ReFresco	MARIN-ReFresco	with	256
ROTAM	ANSYS	ROTAM-ANSYS	without	256
SSPA	FLUENT	SSPA-FLUENT	without	256
SSPA	FLUENT	SSPA-FLUENT	with	256
SSPA	FLUENT	SSPA-FLUENT	with	256
TUHH	CFX	TUHH-CFX	without	256
TUHH	CFX	TUHH-CFX	with	256
TUHH	OpenFOAM	TUHH-OpenFOAM	without	256
TUHH	panMARE	TUHH-panMARE	without	64
TUHH	panMARE	TUHH-panMARE	with	32
VTT	FINFLO	VTT-FINFLO	without	256

Case 3.2

Group	Solver	Acronym	Cavitation	N / turn
Cradle	SCTetra	Cradle-SCTetra	without	512
Cradle	SCTetra	Cradle-SCTetra	with	1024
MARIN	ReFresco	MARIN-ReFresco	without	128
MARIN	ReFresco	MARIN-ReFresco	with	256
ROTAM	ANSYS	ROTAM-ANSYS	without	256
SSPA	FLUENT	SSPA-FLUENT	without	256
SSPA	FLUENT	SSPA-FLUENT	with	256
SSPA	FLUENT	SSPA-FLUENT	with	256
TUHH	CFX	TUHH-CFX	without	256
TUHH	CFX	TUHH-CFX	with	256
TUHH	OpenFOAM	TUHH-OpenFOAM	without	256
TUHH	panMARE	TUHH-panMARE	without	64
TUHH	panMARE	TUHH-panMARE	with	16

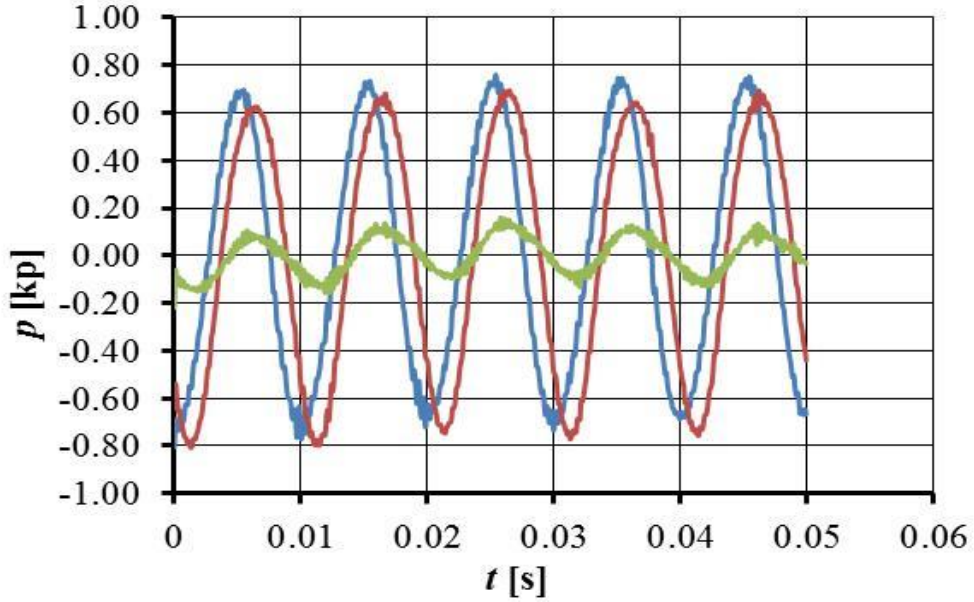
3 Participants

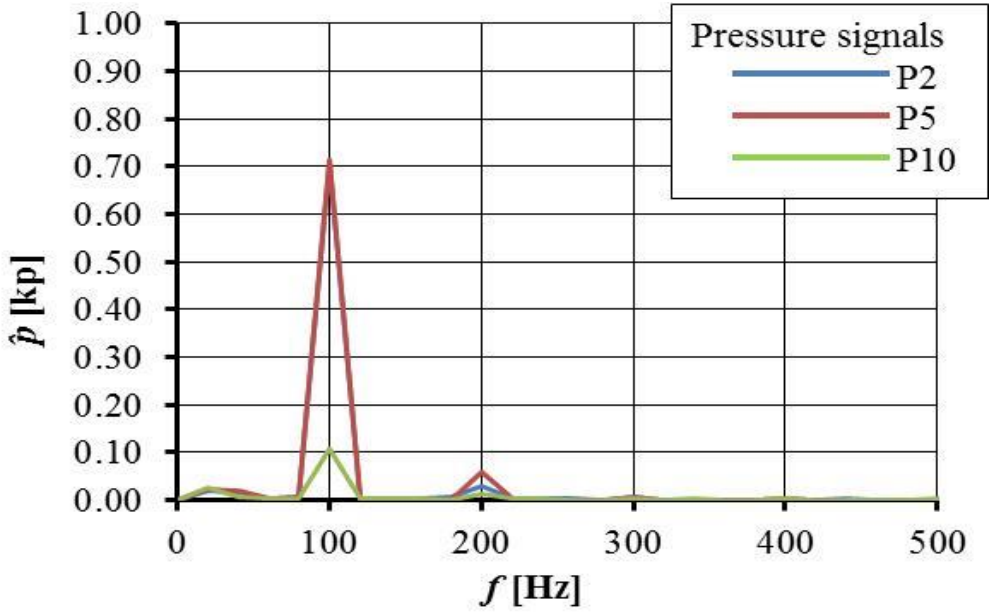
The following institutes have participated:

Case 3.3

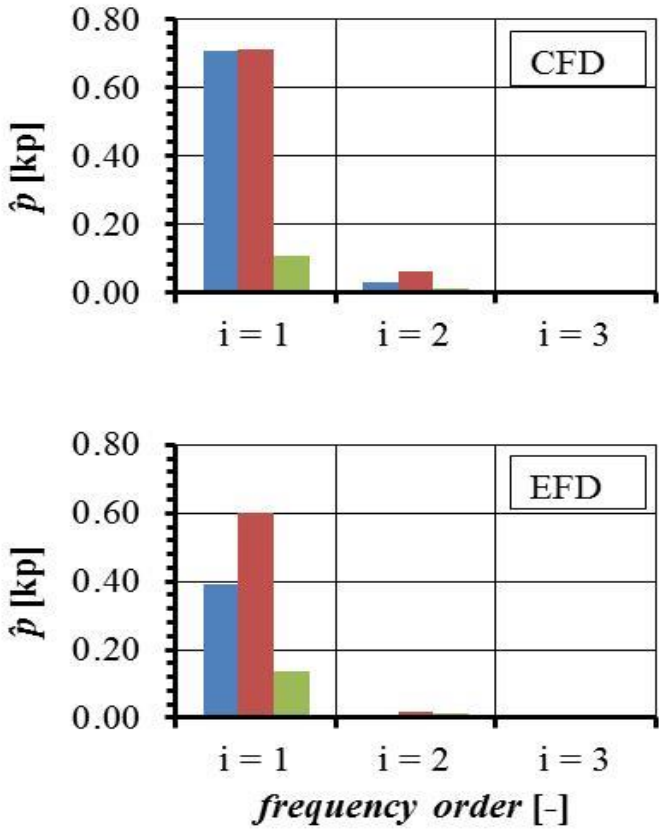
Group	Solver	Acronym	Cavitation	N / turn
Cradle	SCTetra	Cradle-SCTetra	without	512
Cradle	SCTetra	Cradle-SCTetra	with	1024
MARIN	ReFresco	MARIN-ReFresco	without	128
MARIN	ReFresco	MARIN-ReFresco	with	256
ROTAM	ANSYS	ROTAM-ANSYS	without	256
SSPA	FLUENT	SSPA-FLUENT	without	256
SSPA	FLUENT	SSPA-FLUENT	with	256
SSPA	FLUENT	SSPA-FLUENT	with	256
TUHH	CFX	TUHH-CFX	without	256
TUHH	CFX	TUHH-CFX	with	256
TUHH	OpenFOAM	TUHH-OpenFOAM	without	256
TUHH	panMARE	TUHH-panMARE	without	64
TUHH	panMARE	TUHH-panMARE	with	32

3.1.1 Pressure pulses for Ψ^{bP} = 12°: Cradle-SCTetra, without Cavitation

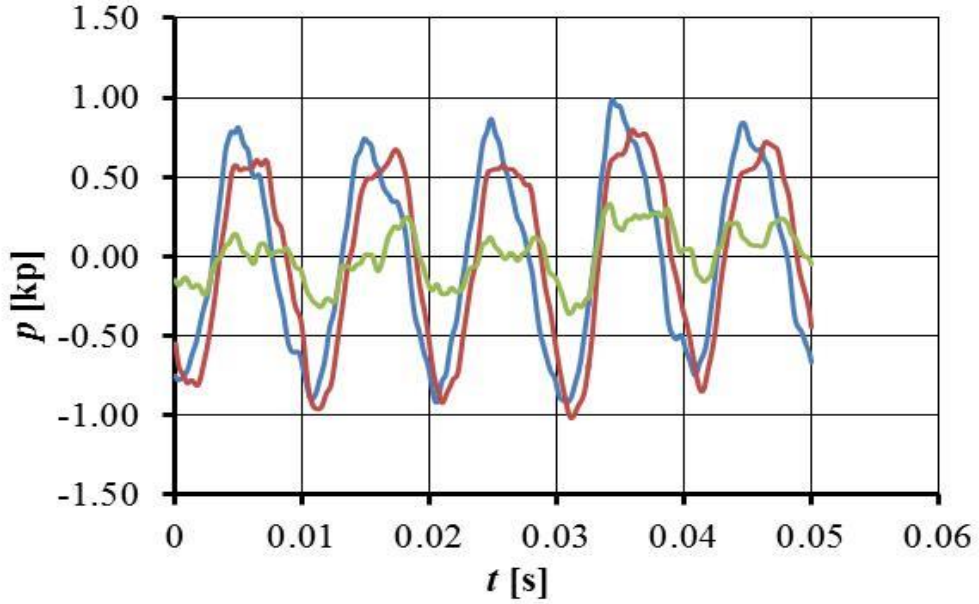


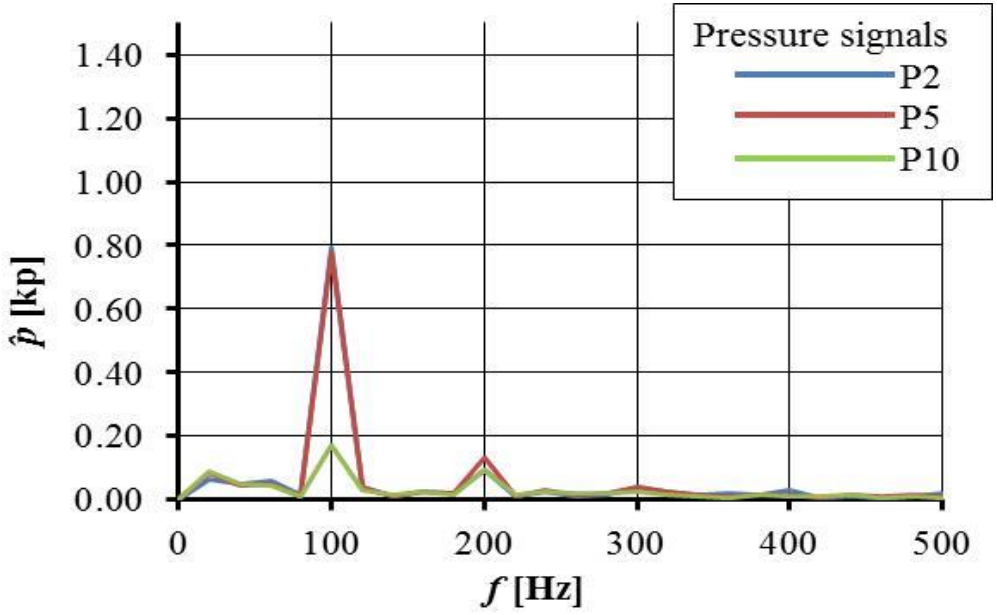


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.7085	0.0294	0.0051
p5	(CFD)	0.7129	0.0582	0.0059
P10	(CFD)	0.1074	0.0116	0.0038
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

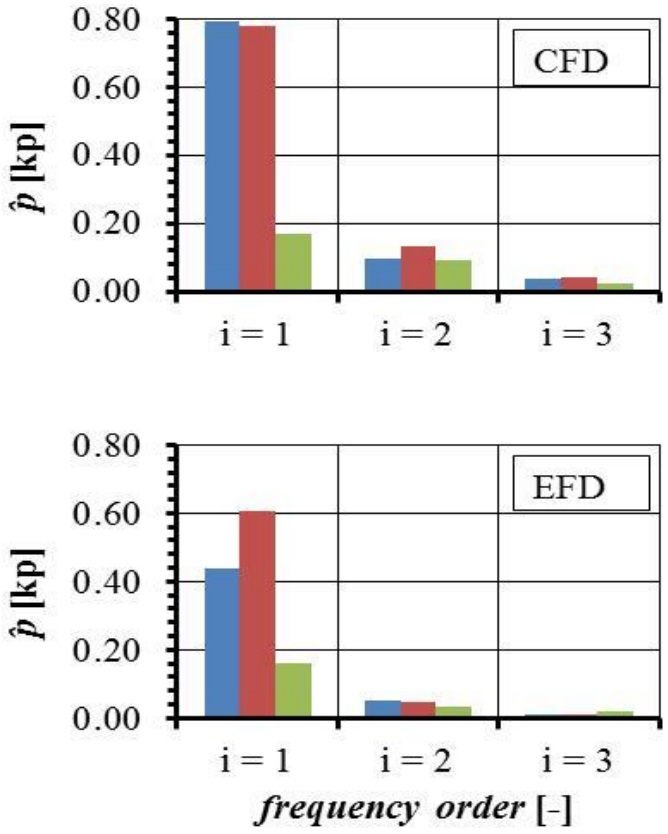


3.1.2 Pressure pulses for Ψ^{bP} = 12°: Cradle-SCTetra, with Cavitation

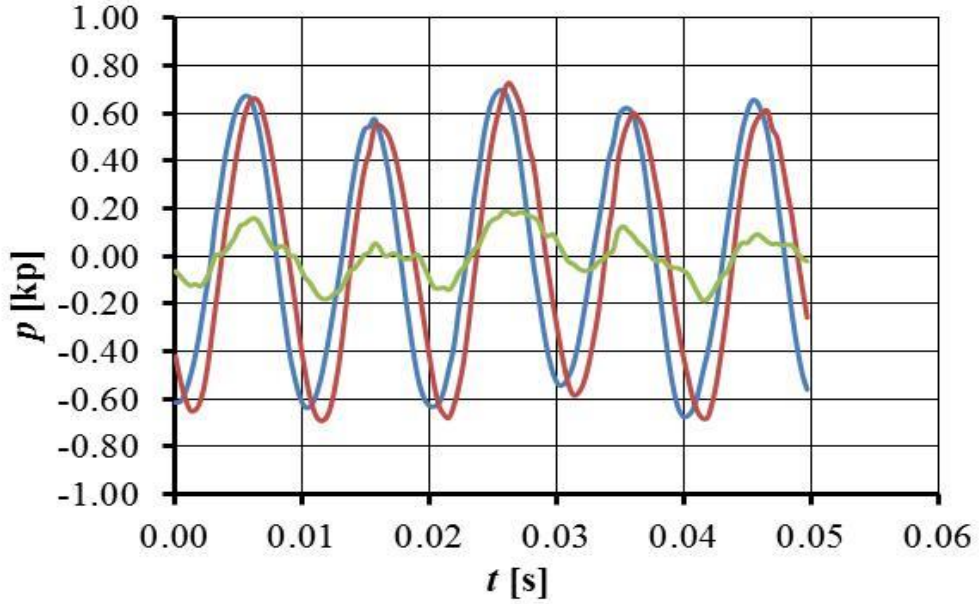


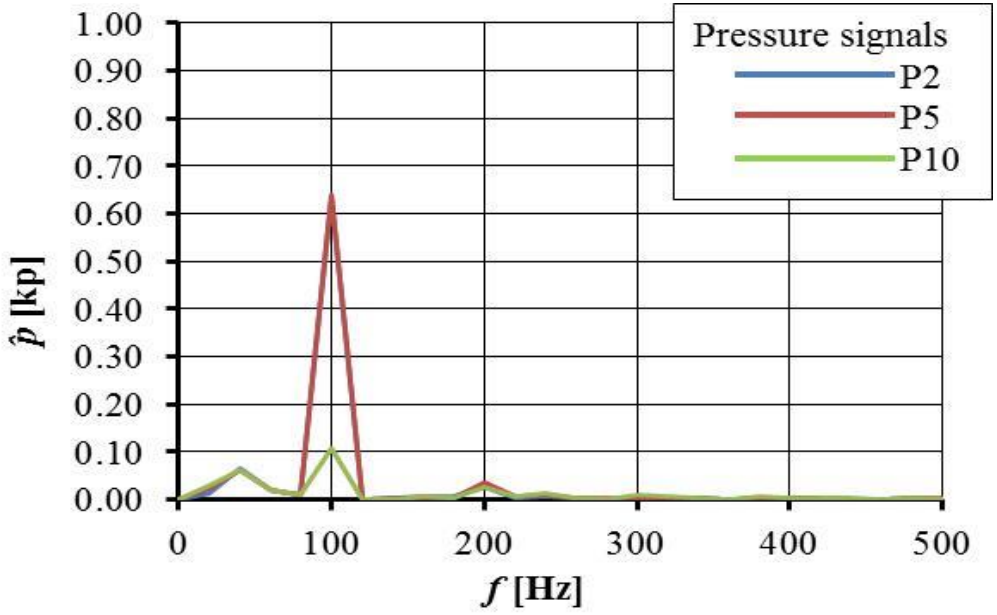


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.7933	0.0948	0.0385
p5	(CFD)	0.7784	0.1337	0.0397
P10	(CFD)	0.1696	0.0941	0.0244
p2	(EFD)	0.4372	0.0525	0.0079
p5	(EFD)	0.6053	0.0484	0.0087
P10	(EFD)	0.1611	0.0318	0.0178

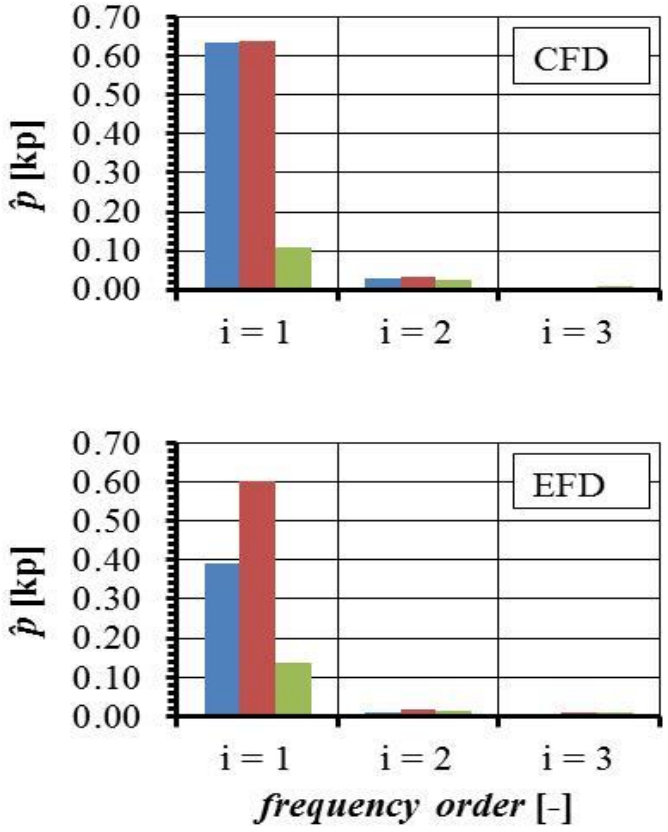


3.1.3 Pressure pulses for Ψ^{bP} = 12°: MARIN-ReFresco, without Cavitation

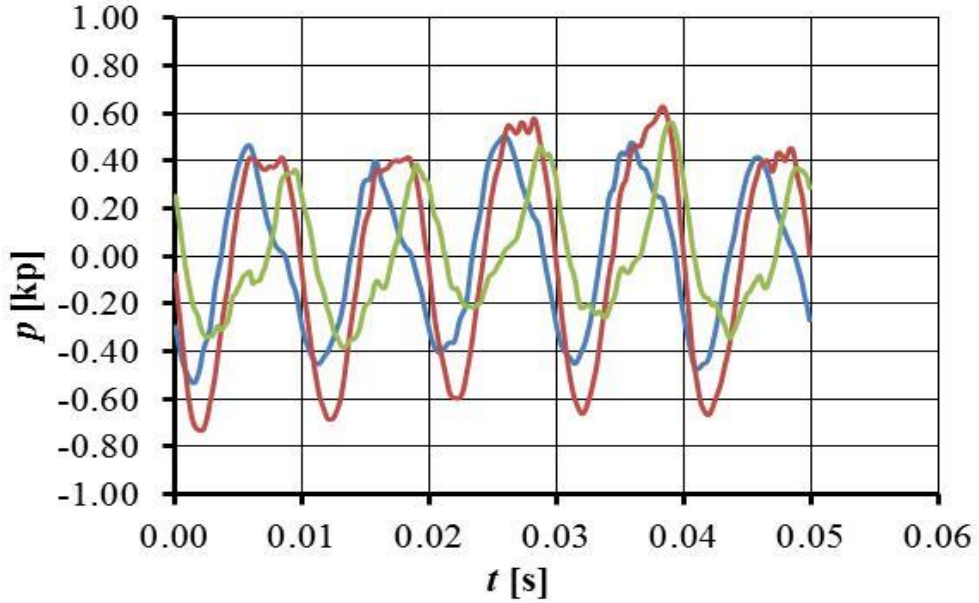


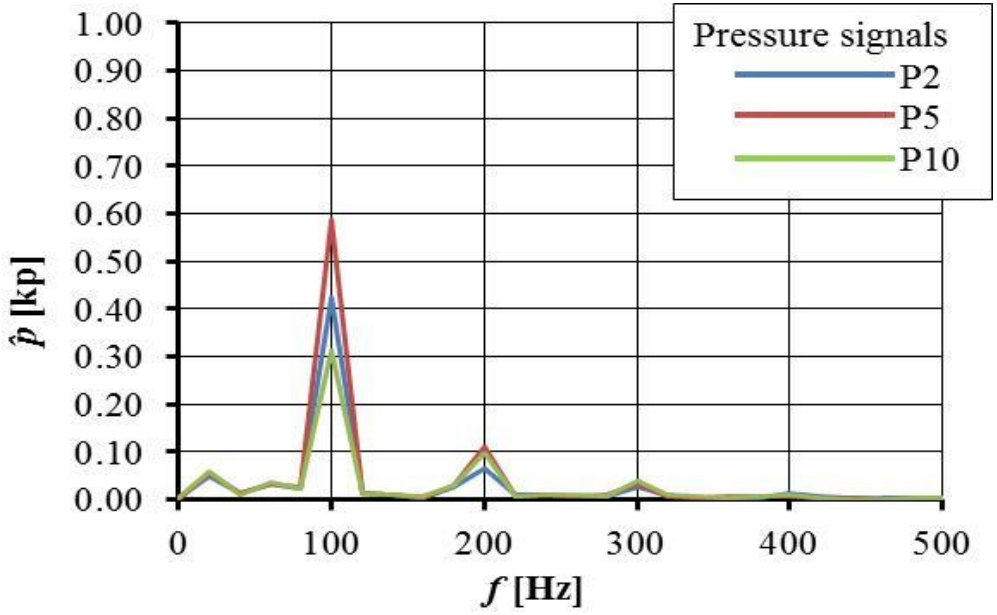


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.6347	0.0269	0.0033
p5	(CFD)	0.6391	0.0347	0.0011
P10	(CFD)	0.1086	0.0254	0.0086
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

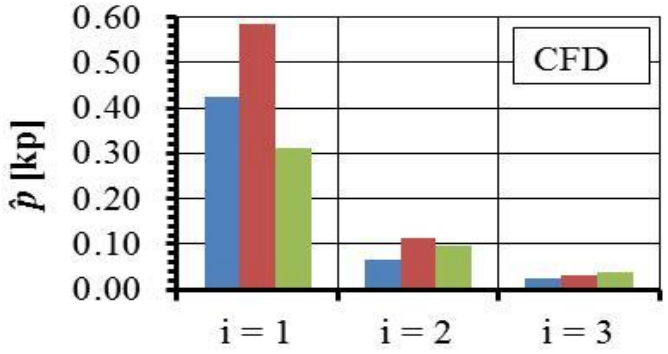


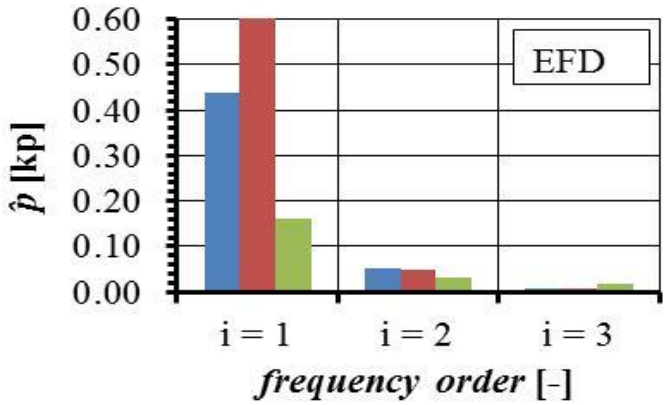
3.1.4 Pressure pulses for Ψ^{bP} = 12°: MARIN-ReFresco, with Cavitation



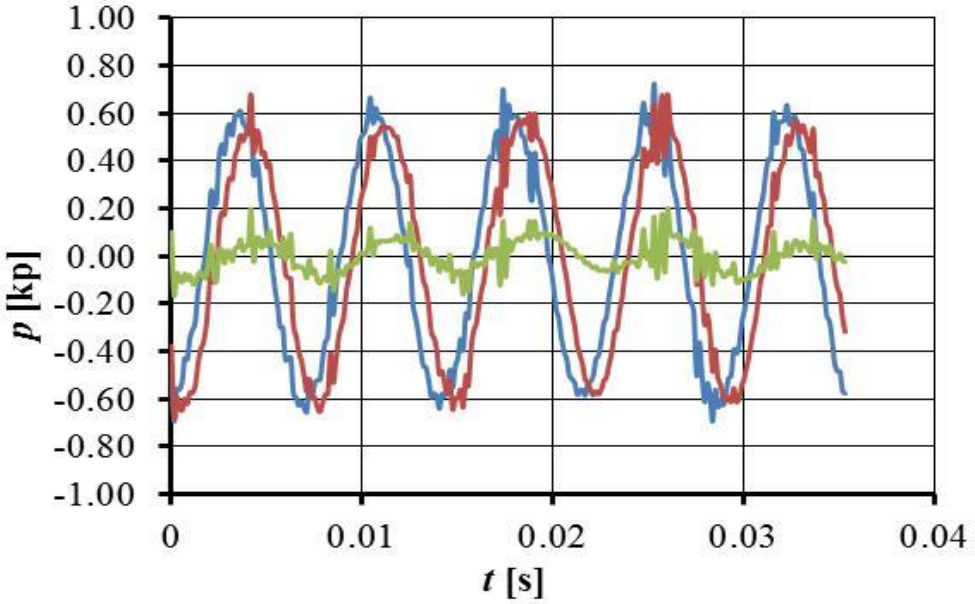


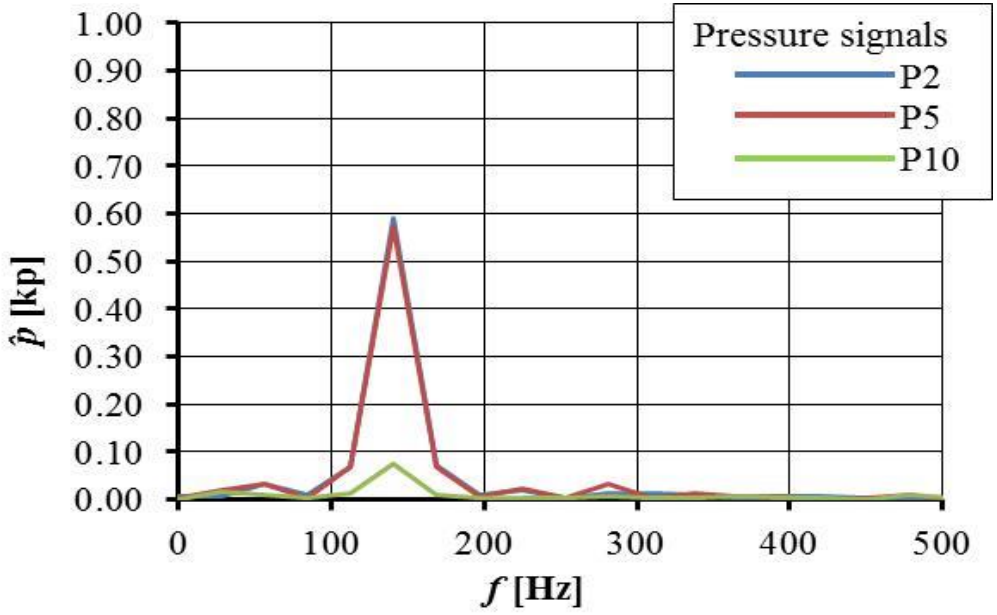
Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4243	0.0652	0.0249
p5	(CFD)	0.5855	0.1118	0.0319
P10	(CFD)	0.3130	0.0973	0.0388
p2	(EFD)	0.4372	0.0525	0.0079
p5	(EFD)	0.6053	0.0484	0.0087
P10	(EFD)	0.1611	0.0318	0.0178



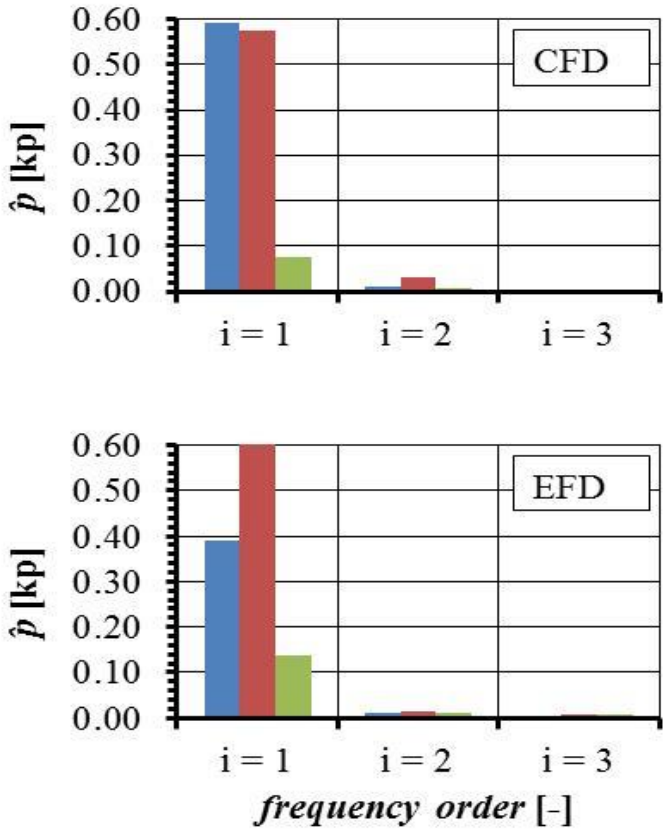


3.1.5 Pressure pulses for Ψ^{bP} = 12°: ROTAM-ANSYS, without Cavitation

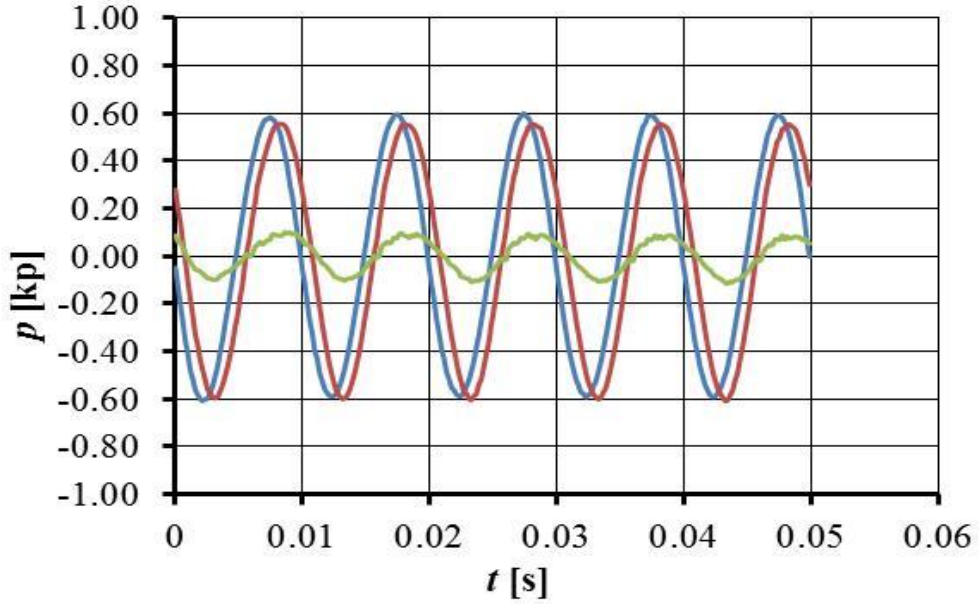


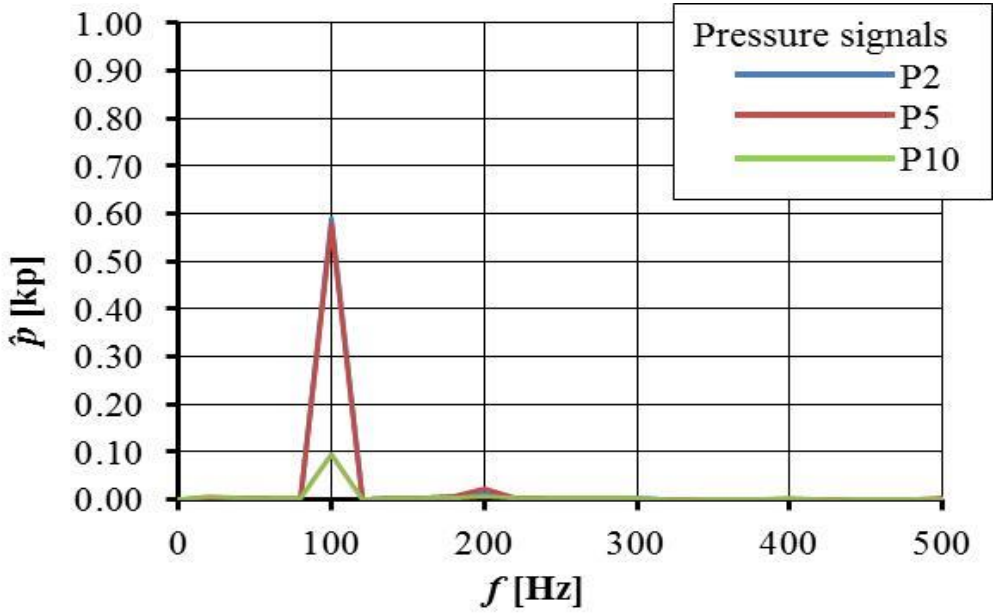


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5896	0.0125	0.0059
p5	(CFD)	0.5734	0.0314	0.0004
P10	(CFD)	0.0761	0.0061	0.0027
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

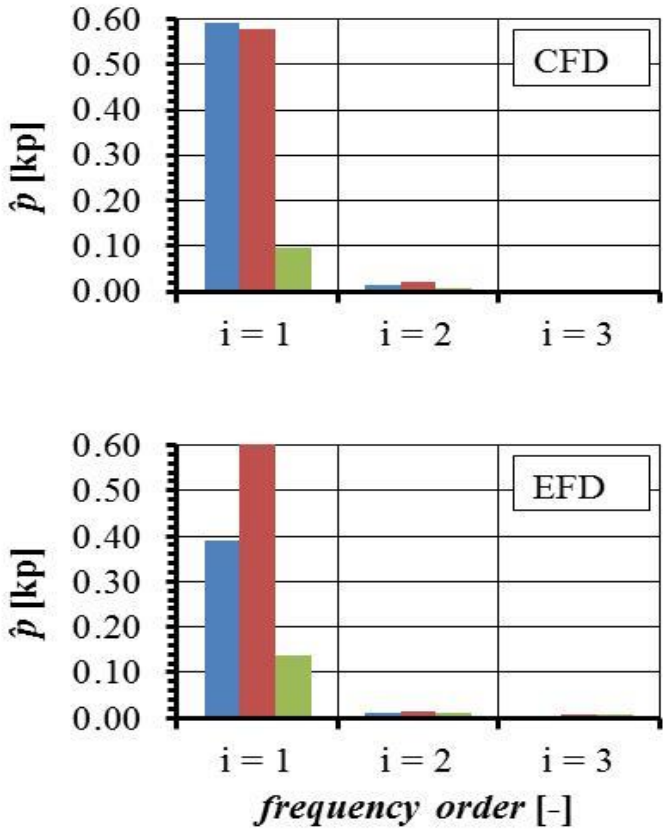


3.1.6 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, without Cavitation

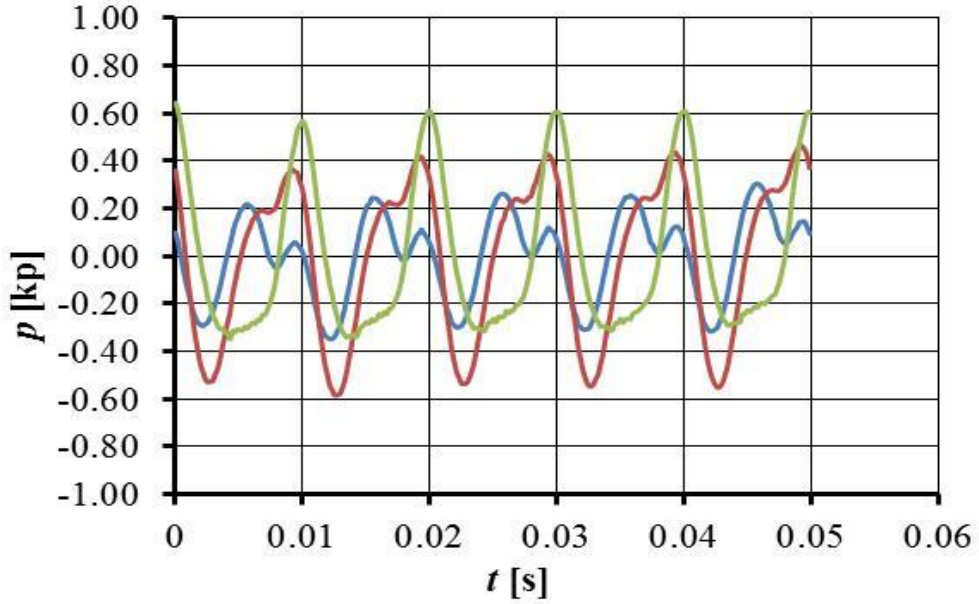


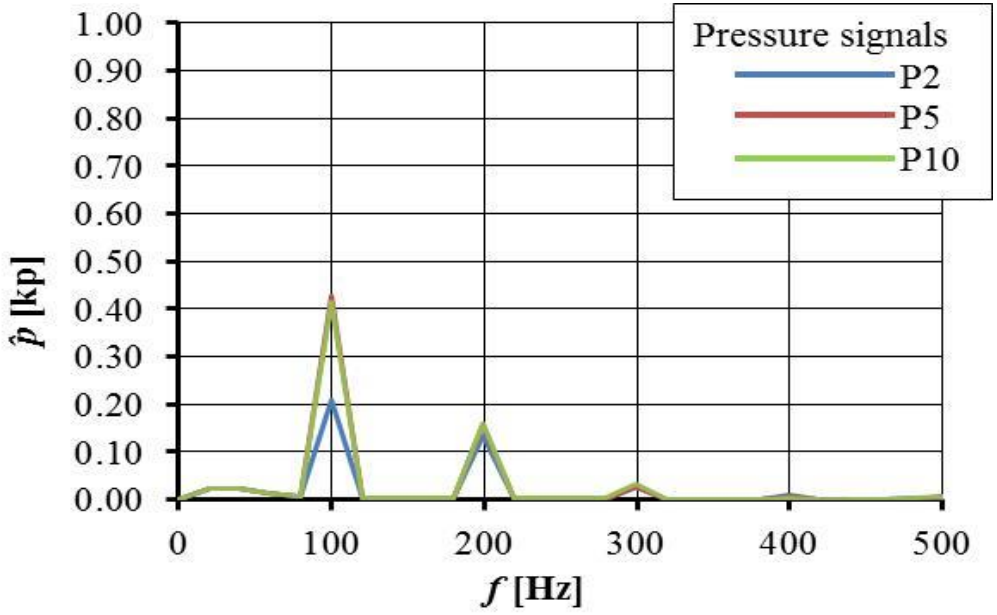


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5907	0.0132	0.0017
p5	(CFD)	0.5778	0.0212	0.0011
P10	(CFD)	0.0955	0.0069	0.0018
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

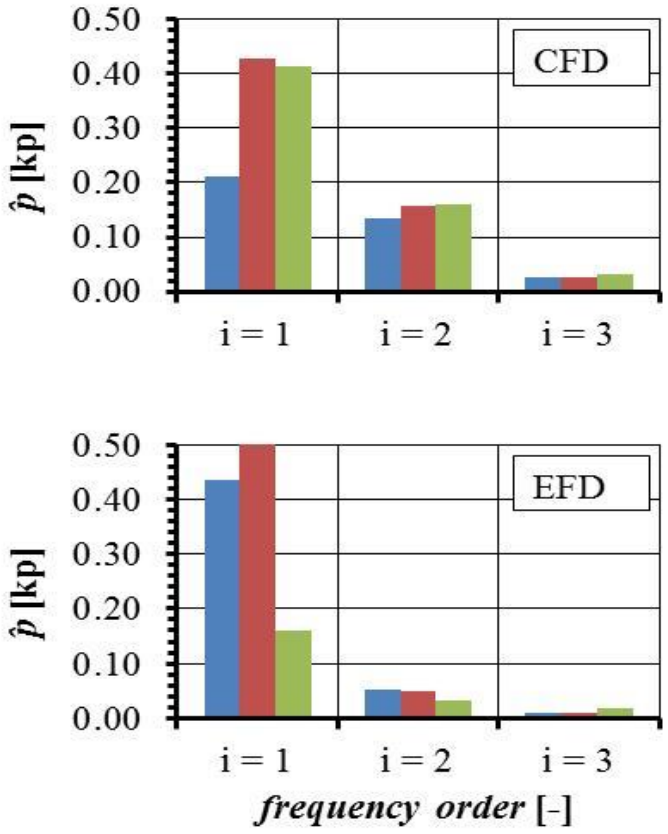


3.1.7 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, with Cavitation

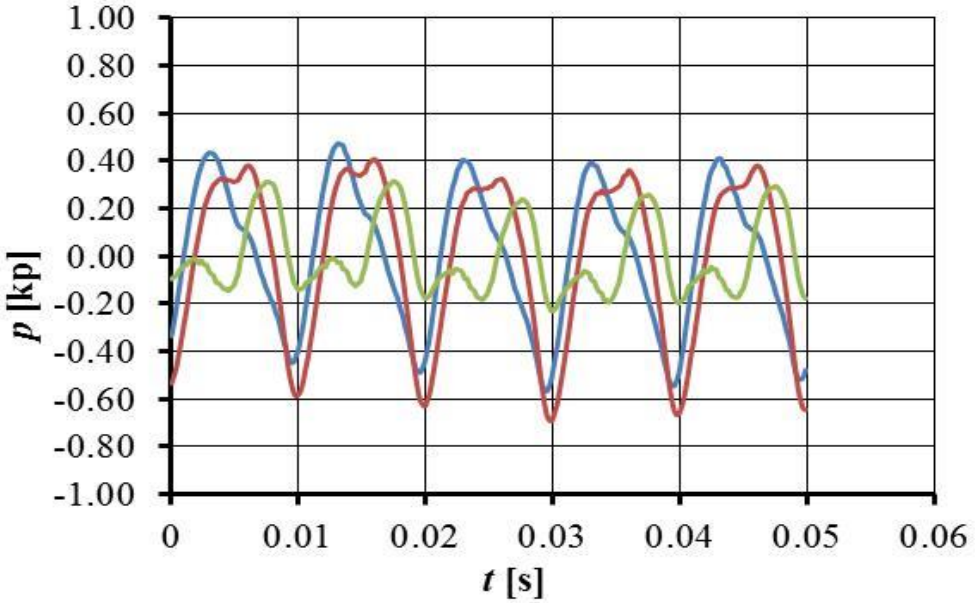


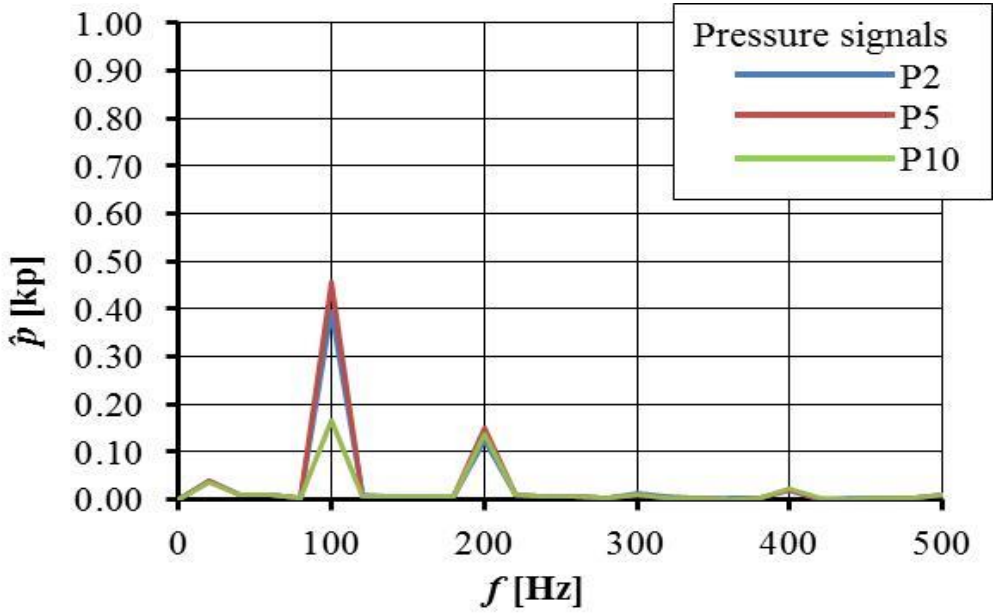


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.2100	0.1348	0.0265
p5	(CFD)	0.4285	0.1578	0.0257
P10	(CFD)	0.4144	0.1610	0.0313
p2	(EFD)	0.4372	0.0525	0.0079
p5	(EFD)	0.6053	0.0484	0.0087
P10	(EFD)	0.1611	0.0318	0.0178

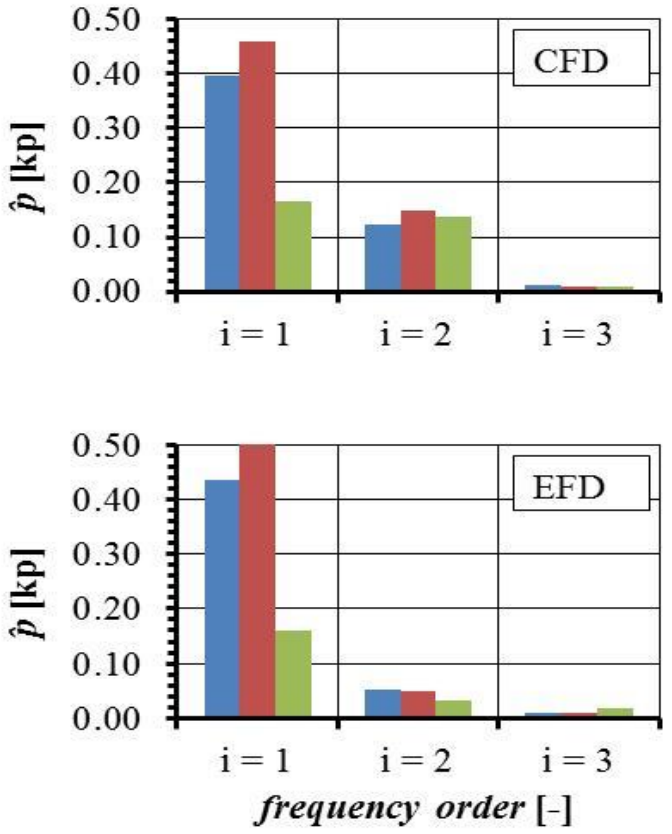


3.1.8 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, with Cavitation, Sauer

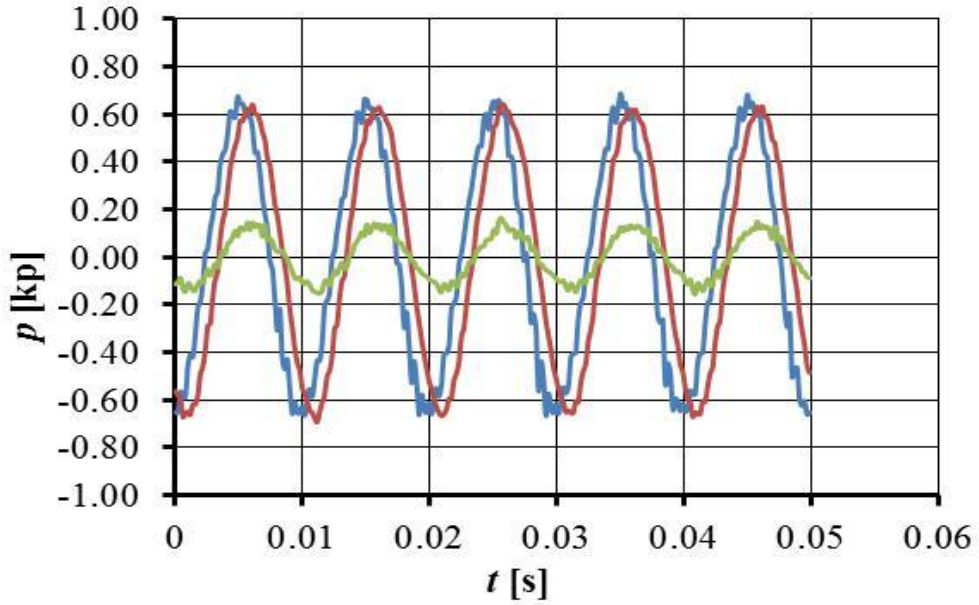


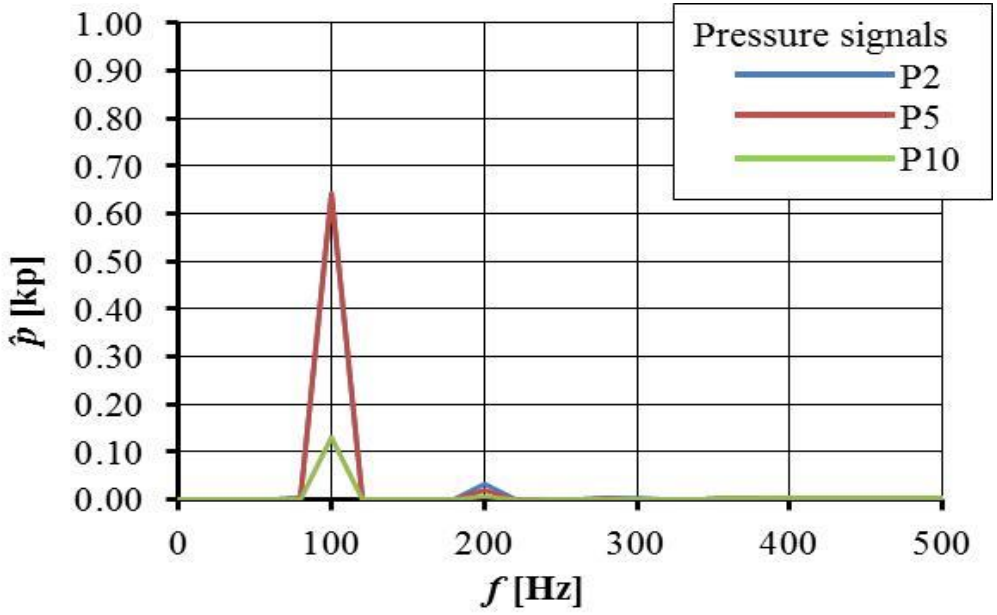


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.3961	0.1238	0.0113
p5	(CFD)	0.4574	0.1483	0.0104
P10	(CFD)	0.1668	0.1360	0.0101
p2	(EFD)	0.4372	0.0525	0.0079
p5	(EFD)	0.6053	0.0484	0.0087
P10	(EFD)	0.1611	0.0318	0.0178

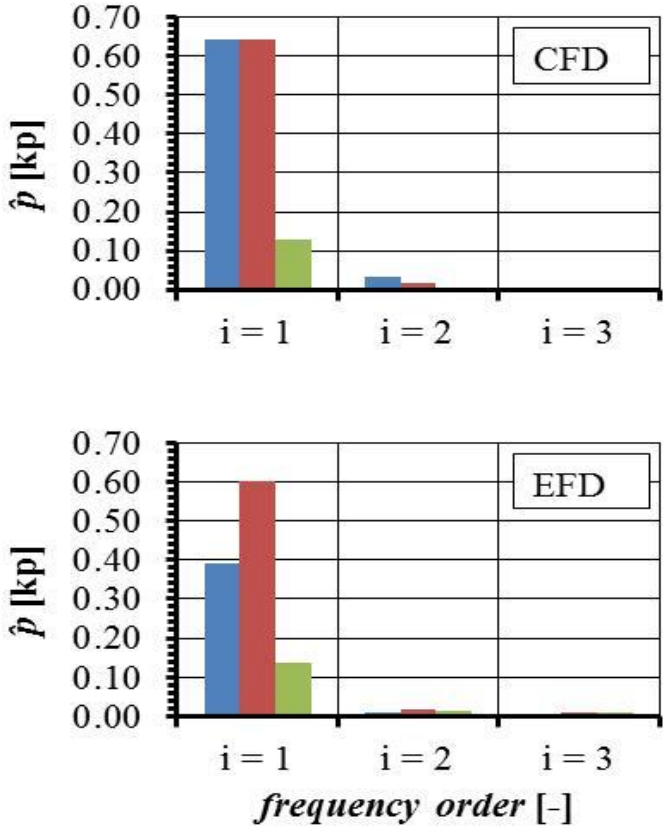


3.1.9 Pressure pulses for Ψ^{bP} = 12°: TUHH-CFX, without Cavitation

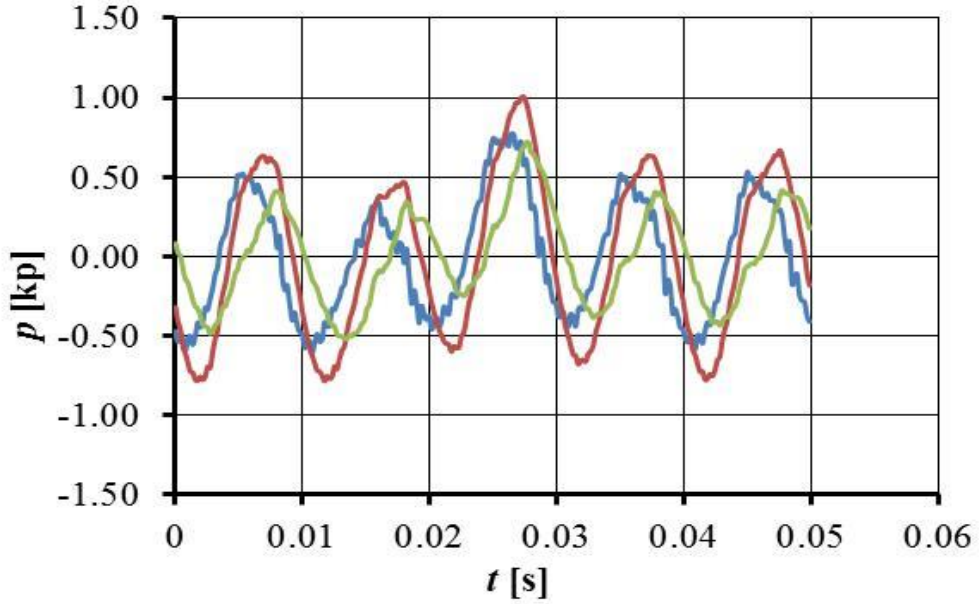


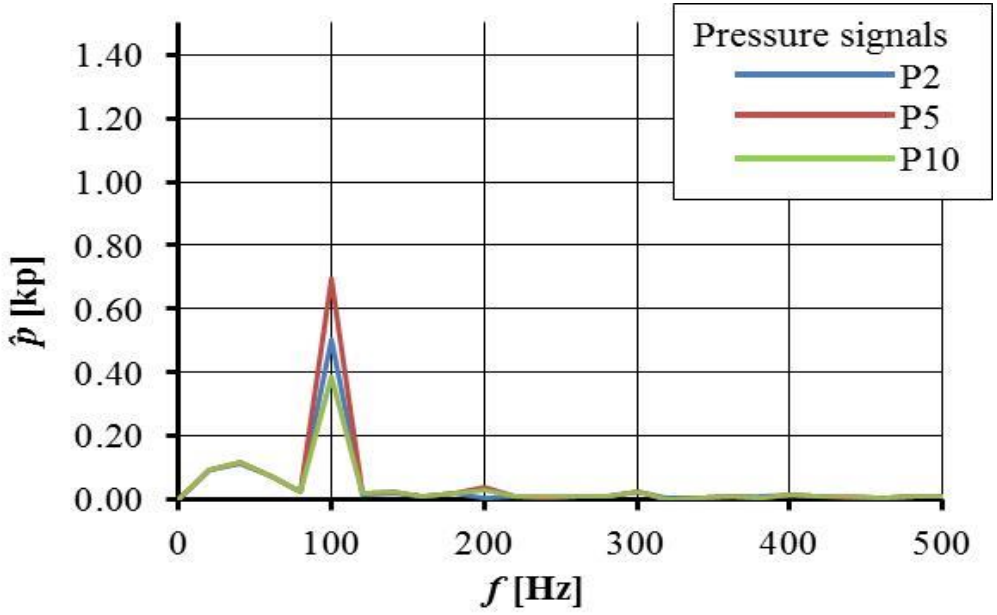


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.6435	0.0308	0.0034
p5	(CFD)	0.6413	0.0178	0.0004
P10	(CFD)	0.1297	0.0047	0.0007
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

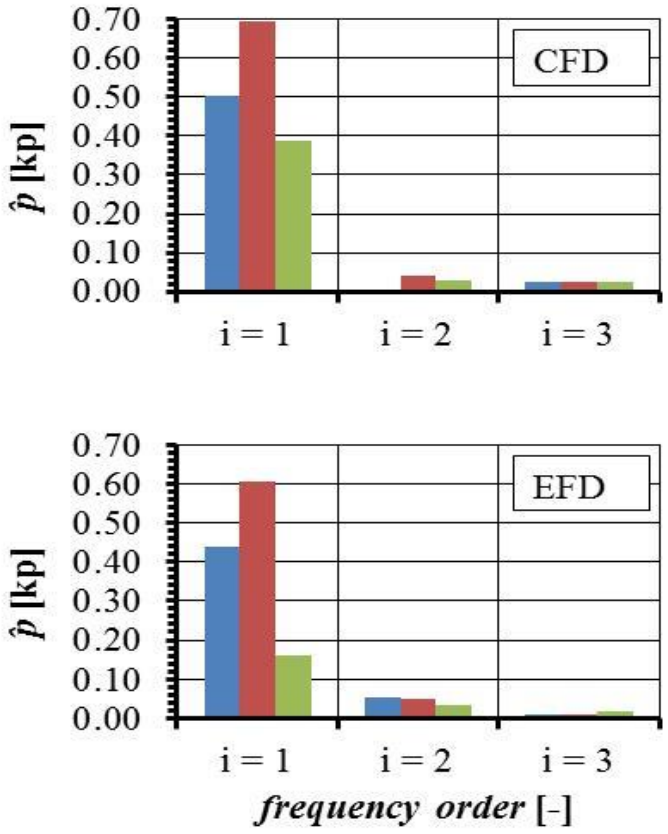


3.1.10 Pressure pulses for Ψ^{bP} = 12°: TUHH-CFX, with Cavitation

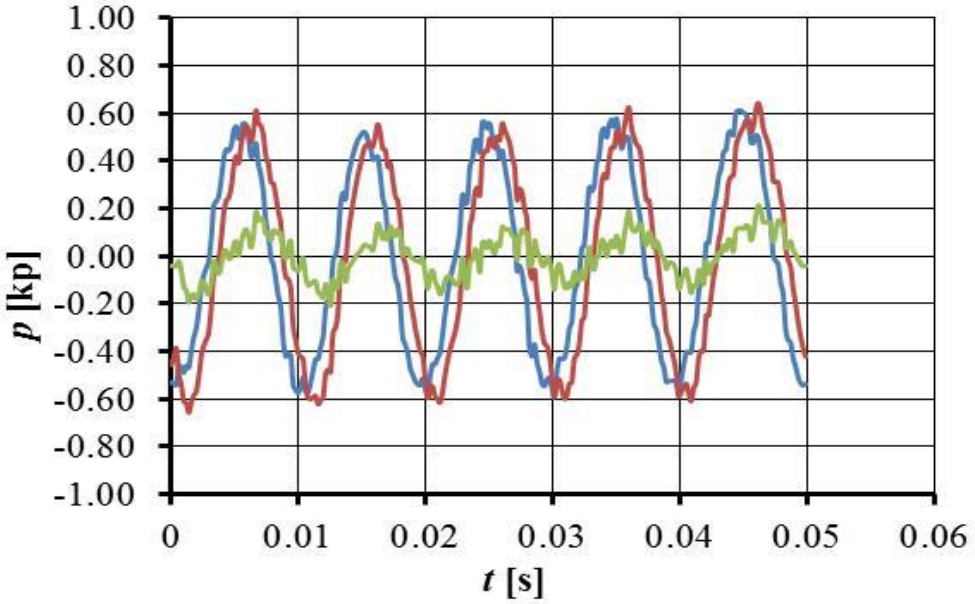


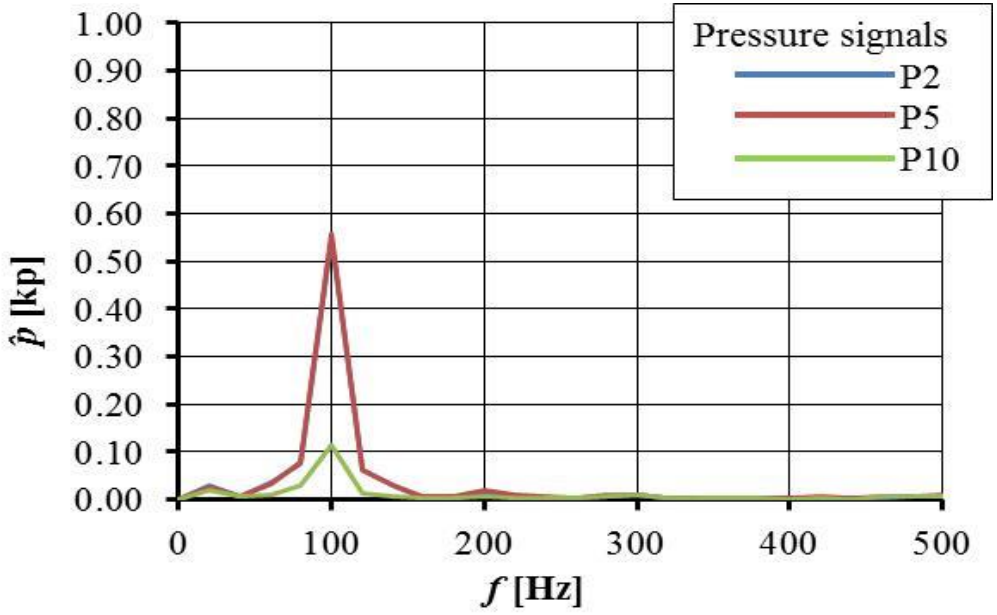


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5020	0.0023	0.0229
p5	(CFD)	0.6949	0.0406	0.0254
P10	(CFD)	0.3874	0.0283	0.0259
p2	(EFD)	0.4372	0.0525	0.0079
p5	(EFD)	0.6053	0.0484	0.0087
P10	(EFD)	0.1611	0.0318	0.0178

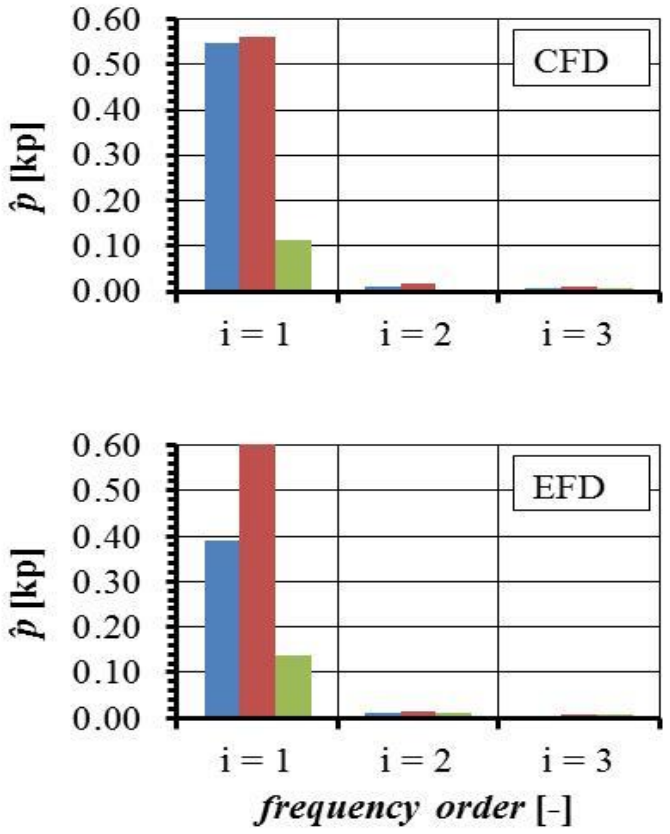


3.1.11 Pressure pulses for Ψ^{bP} = 12°: TUHH-OpenFOAM, without Cavitation

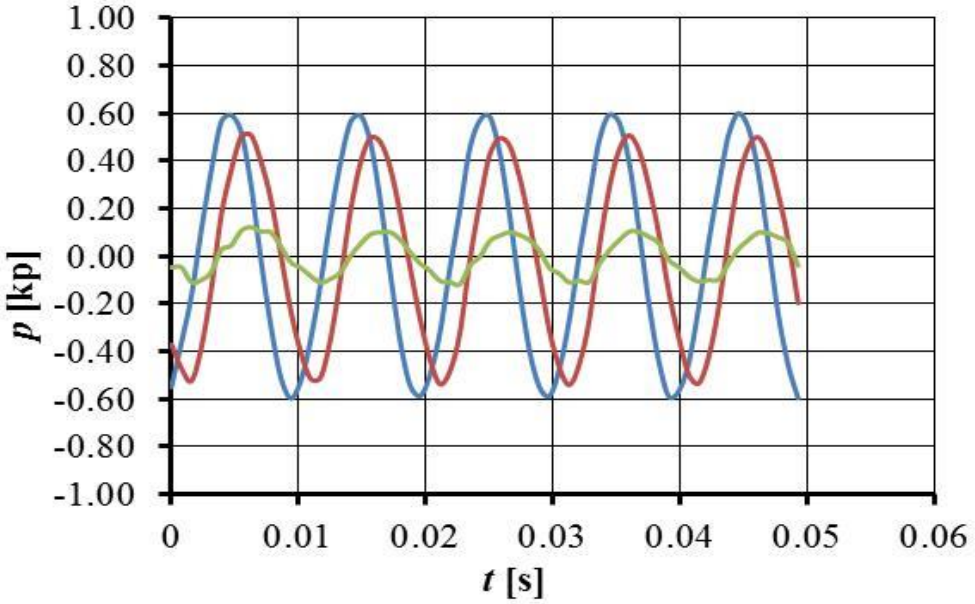


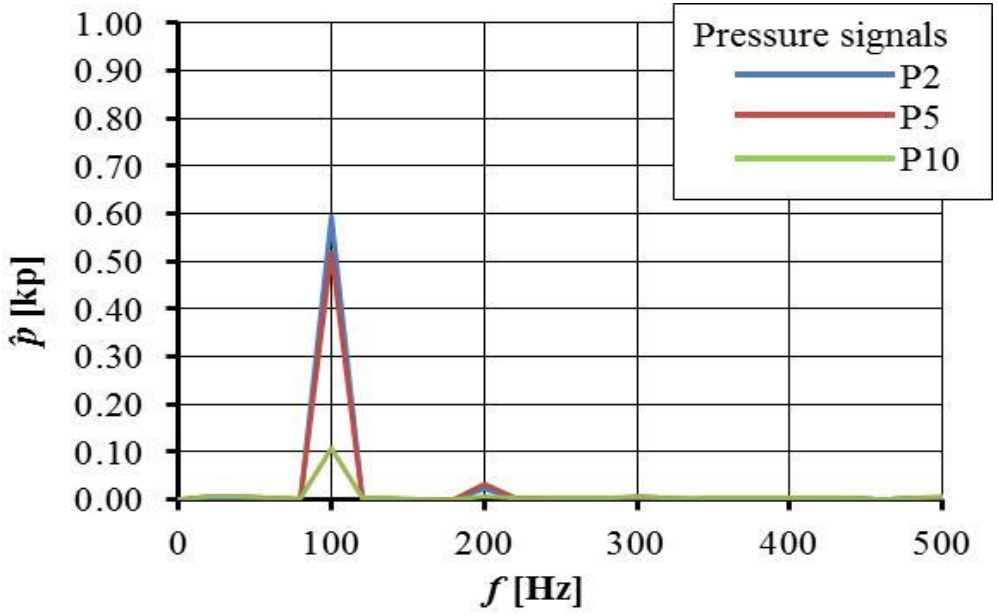


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5471	0.0126	0.0081
p5	(CFD)	0.5591	0.0193	0.0106
P10	(CFD)	0.1134	0.0047	0.0085
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

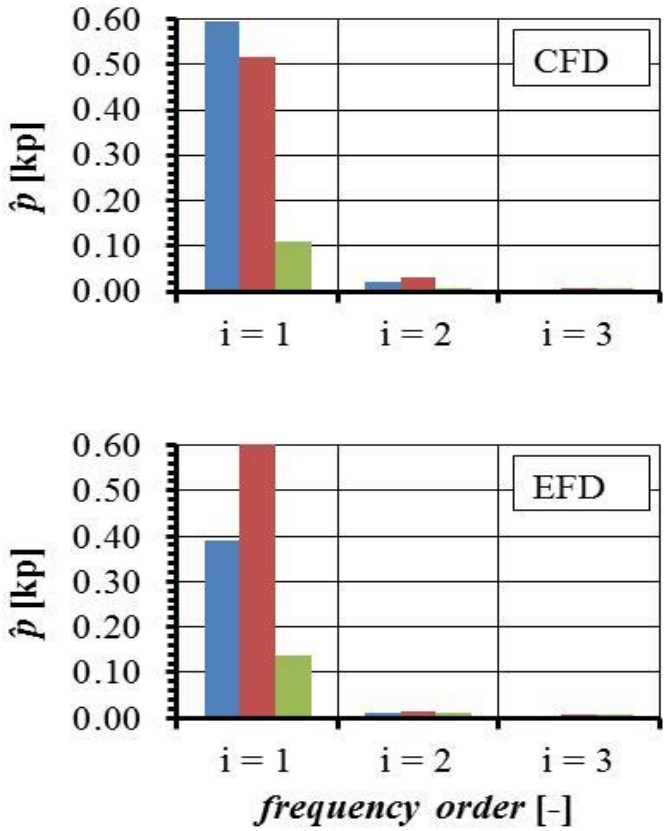


3.1.12 Pressure pulses for Ψ^{bP} = 12°: TUHH-panMARE, without Cavitation

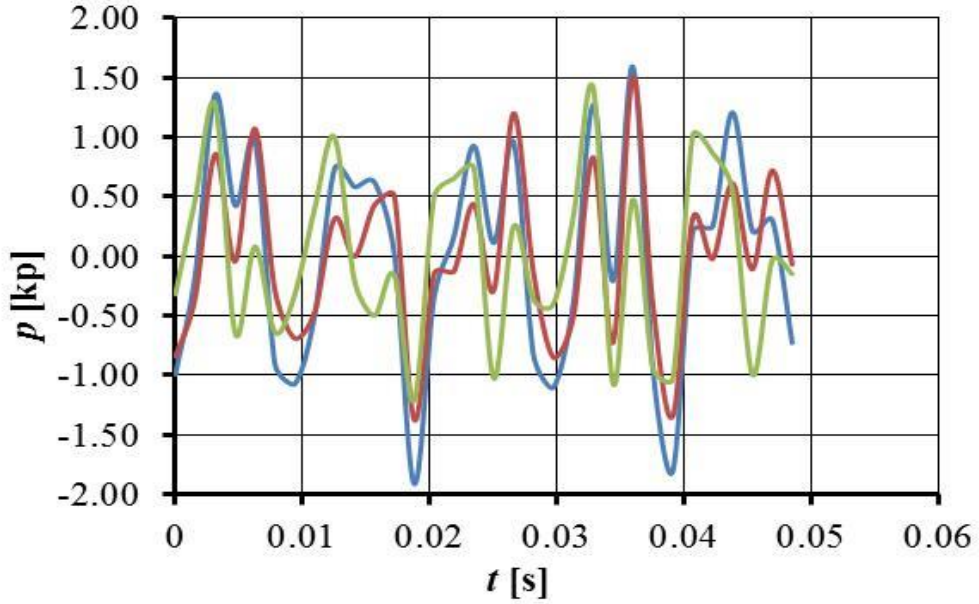


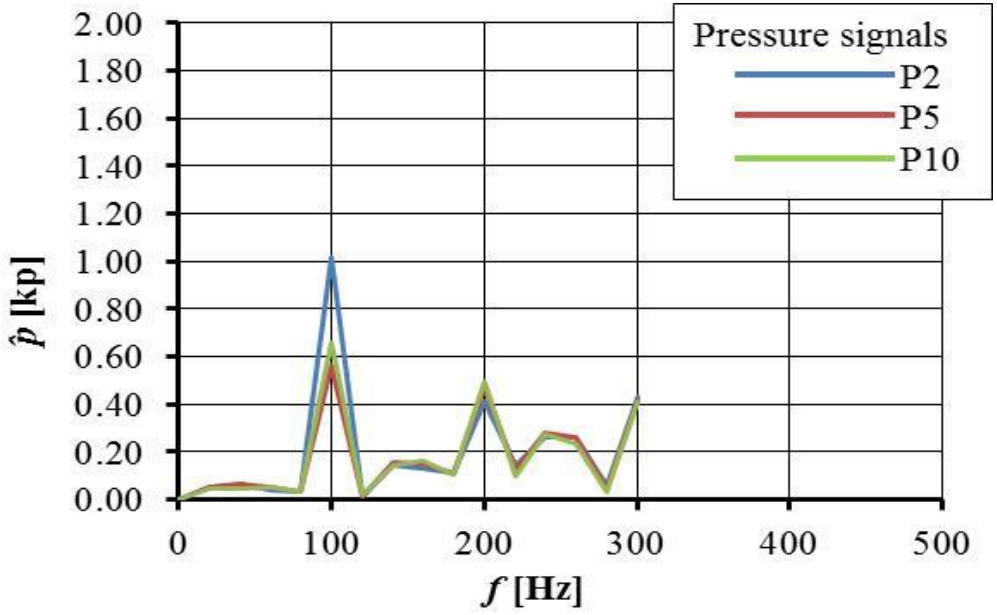


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5941	0.0222	0.0020
p5	(CFD)	0.5170	0.0310	0.0066
P10	(CFD)	0.1085	0.0065	0.0075
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

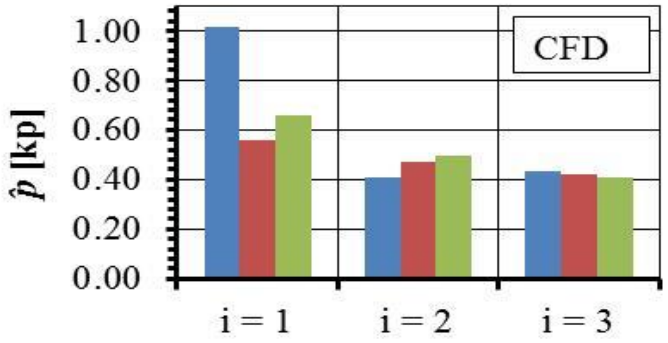


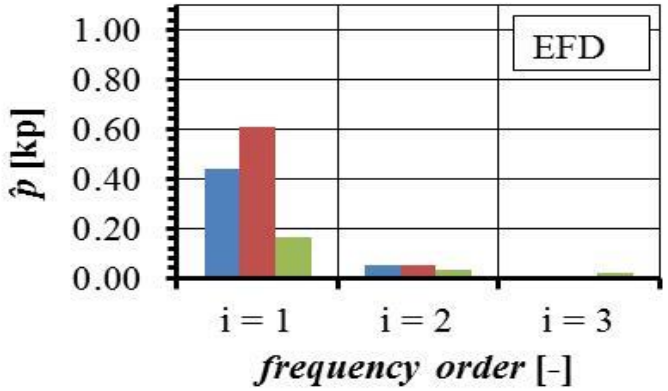
3.1.13 Pressure pulses for Ψ^{bP} = 12°: TUHH-panMARE, with Cavitation



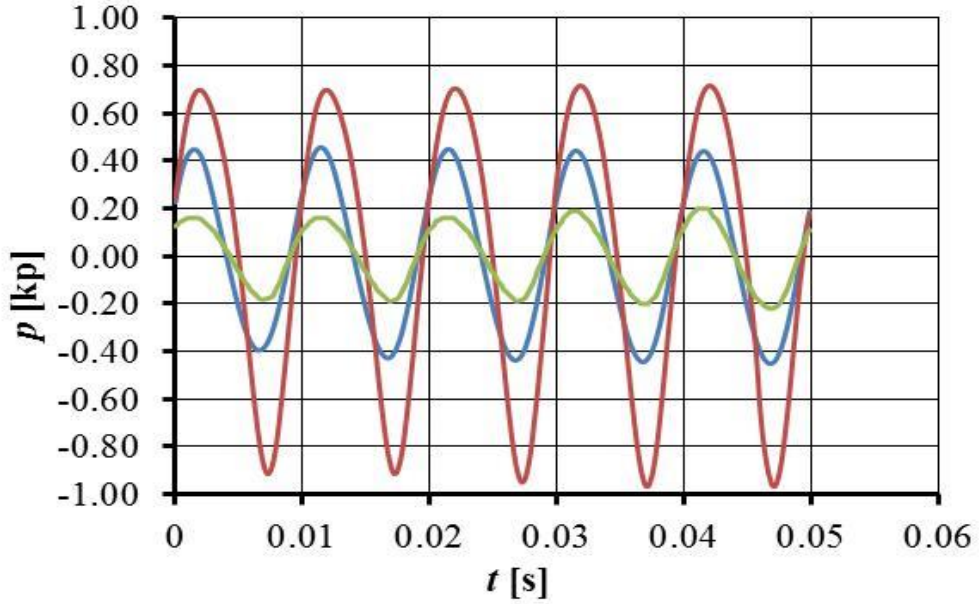


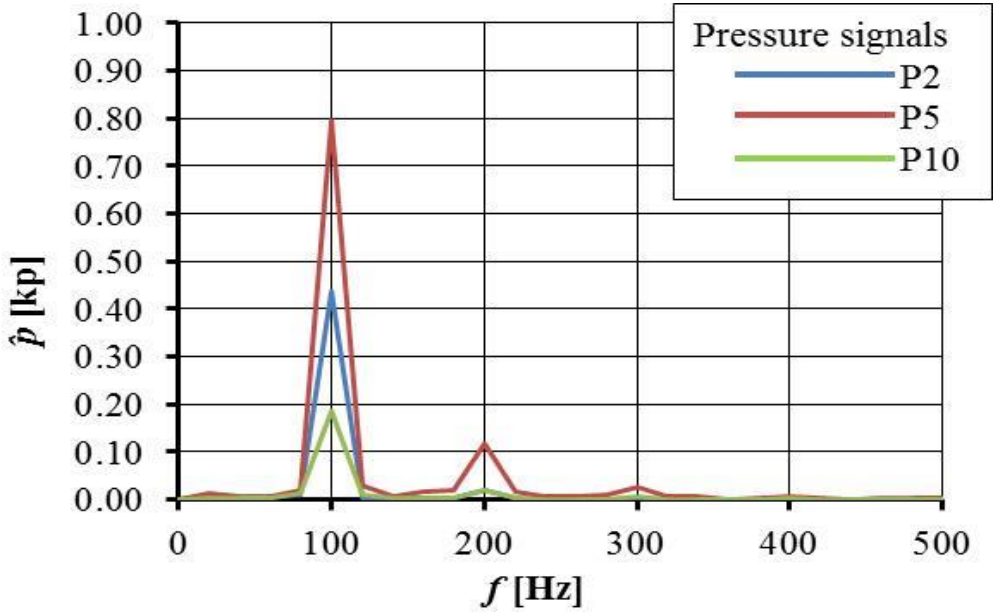
Sensor		i = 1	i = 2	i = 3
p2	(CFD)	1.0153	0.4112	0.4322
p5	(CFD)	0.5582	0.4725	0.4190
P10	(CFD)	0.6599	0.4959	0.4102
p2	(EFD)	0.4372	0.0525	0.0079
p5	(EFD)	0.6053	0.0484	0.0087
P10	(EFD)	0.1611	0.0318	0.0178



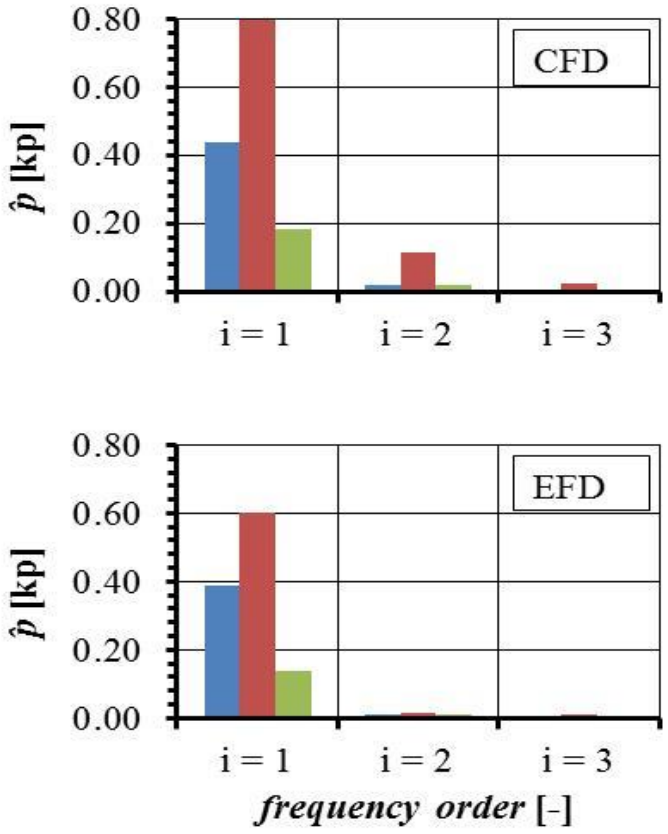


3.1.14 Pressure pulses for Ψ^{bP} = 12°: VTT-FINFLO, without Cavitation

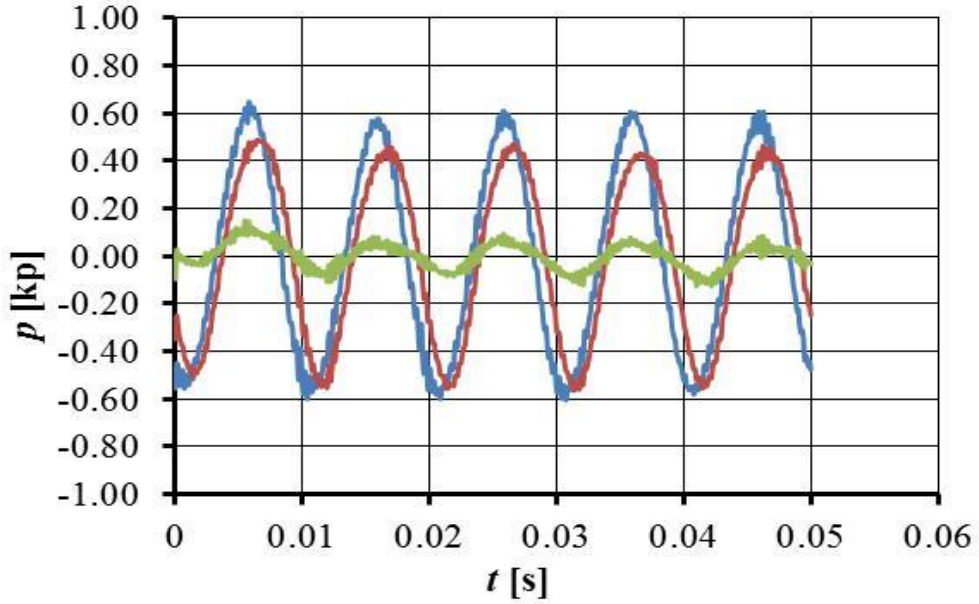


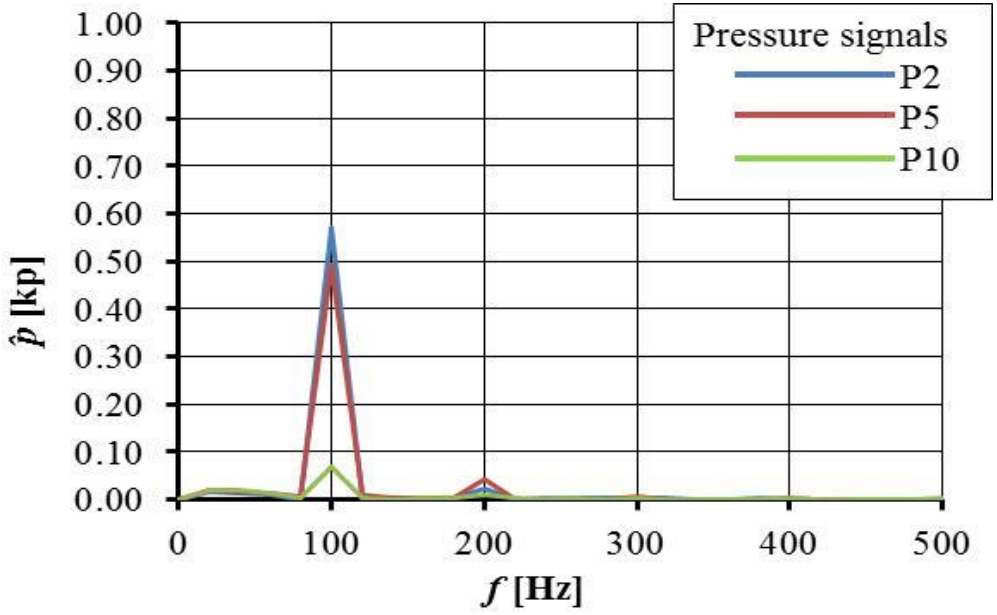


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4367	0.0180	0.0030
p5	(CFD)	0.7963	0.1161	0.0255
P10	(CFD)	0.1842	0.0182	0.0050
p2	(EFD)	0.3899	0.0107	0.0047
p5	(EFD)	0.6017	0.0159	0.0081
P10	(EFD)	0.1373	0.0113	0.0076

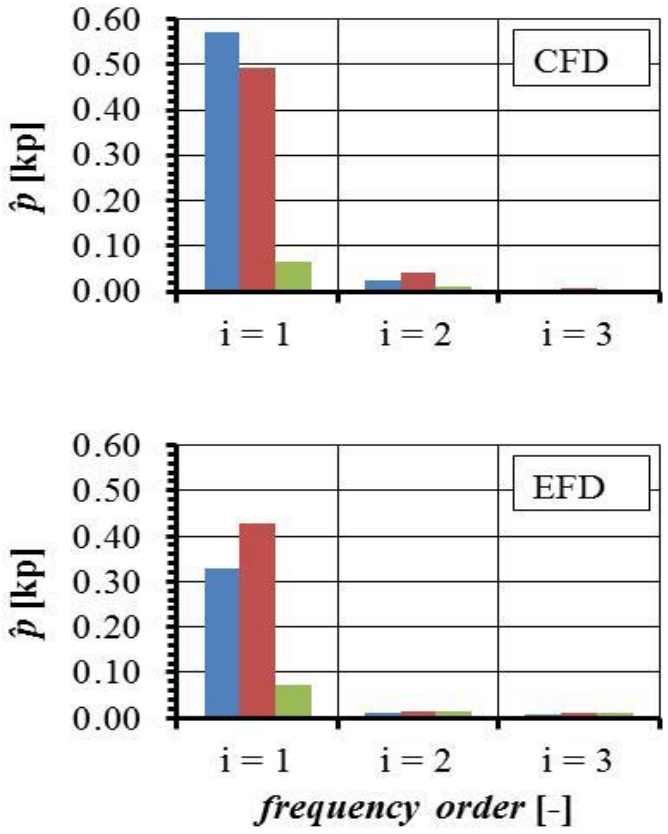


3.2.1 Pressure pulses for Ψ^{bP} = 12°: Cradle-SCTetra, without Cavitation

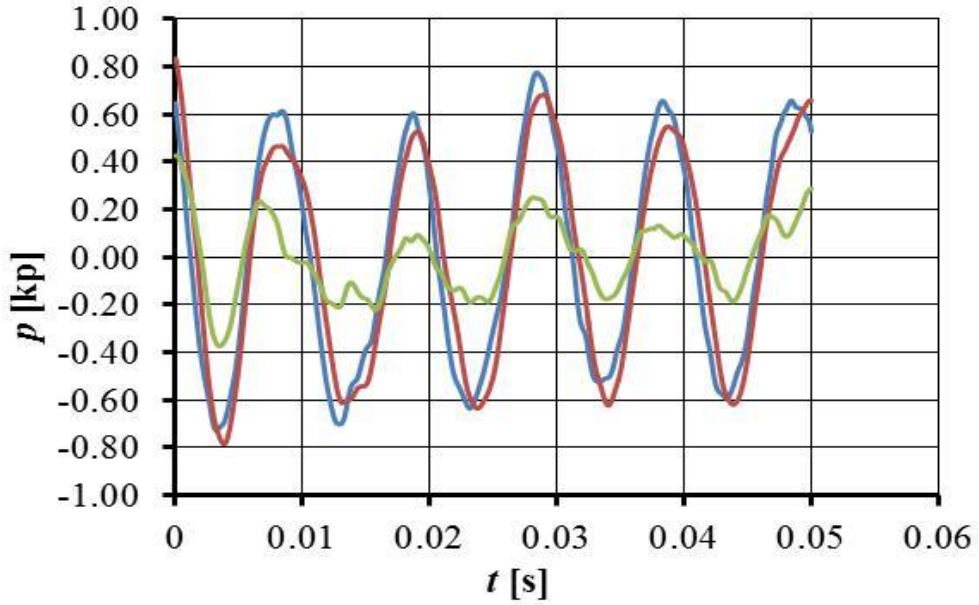


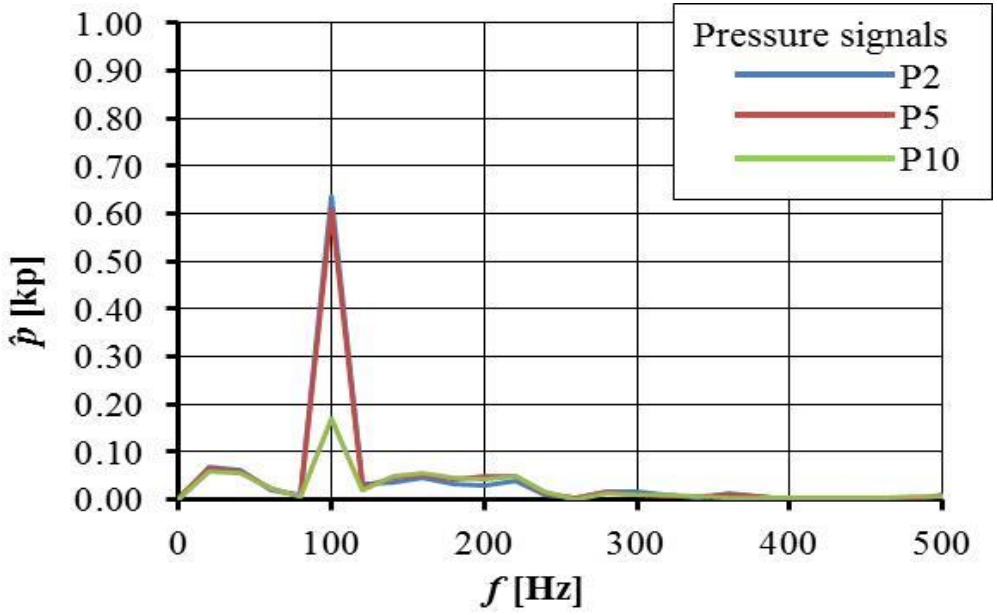


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5701	0.0236	0.0031
p5	(CFD)	0.4918	0.0432	0.0062
P10	(CFD)	0.0672	0.0105	0.0017
p2	(EFD)	0.3277	0.0103	0.0080
p5	(EFD)	0.4266	0.0152	0.0108
P10	(EFD)	0.0711	0.0142	0.0104

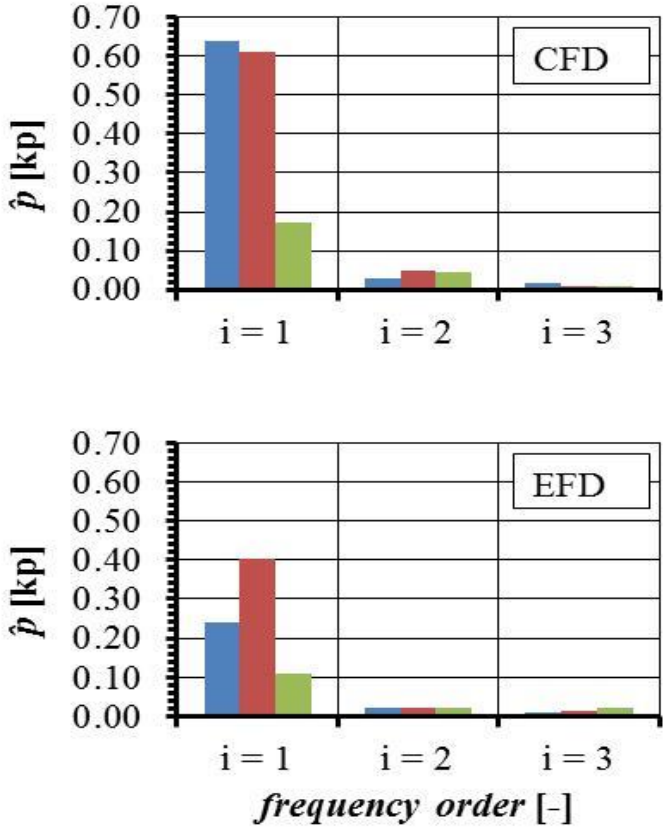


3.2.2 Pressure pulses for Ψ^{bP} = 12°: Cradle-SCTetra, with Cavitation

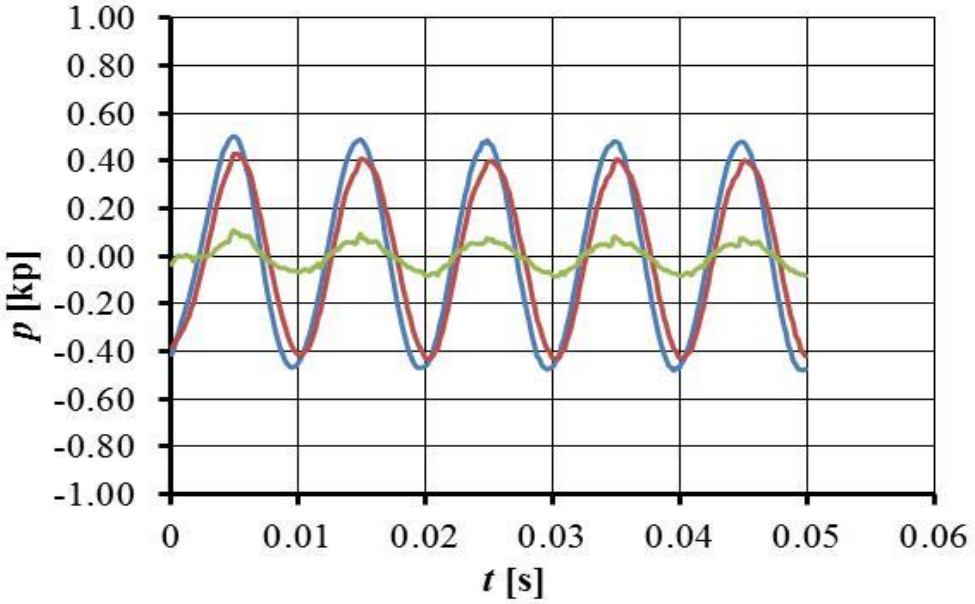


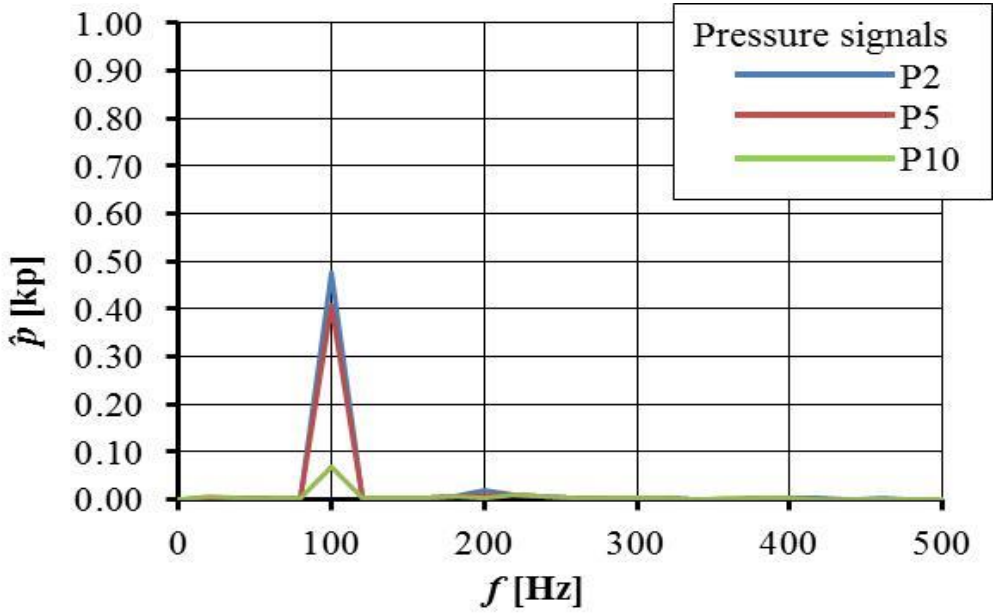


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.6369	0.0280	0.0153
p5	(CFD)	0.6105	0.0499	0.0107
P10	(CFD)	0.1707	0.0435	0.0098
p2	(EFD)	0.2387	0.0206	0.0091
p5	(EFD)	0.4017	0.0196	0.0130
P10	(EFD)	0.1096	0.0227	0.0207

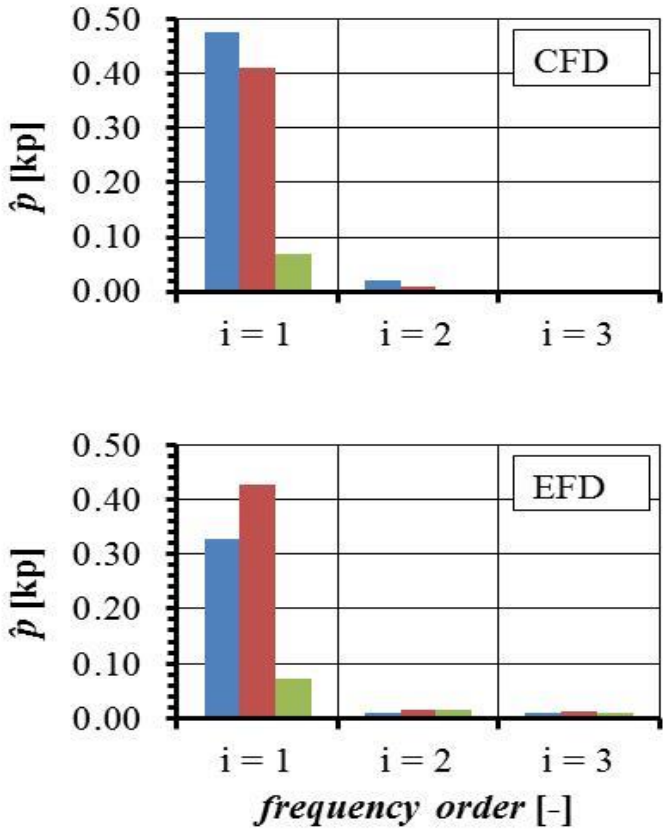


3.2.3 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, without Cavitation

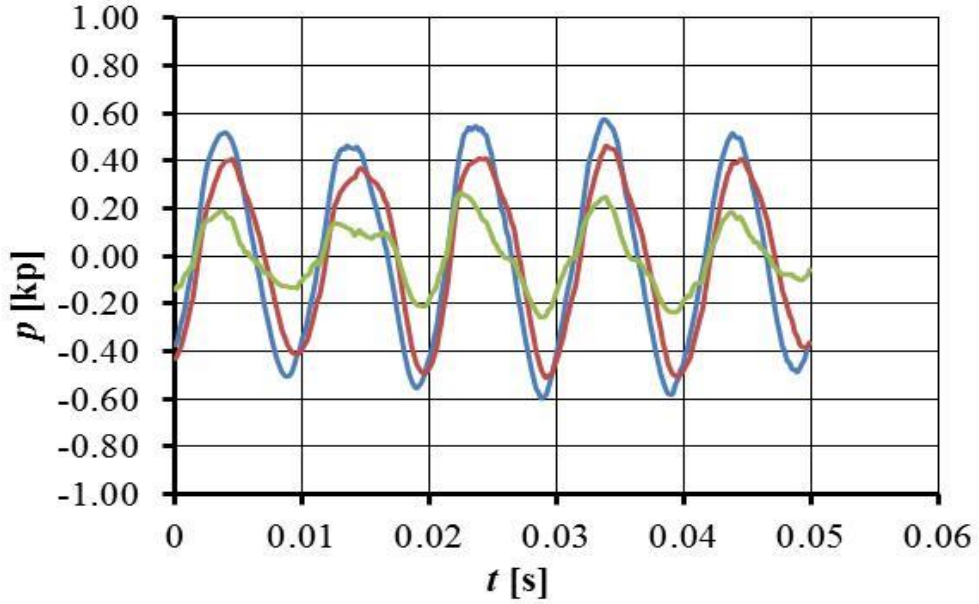


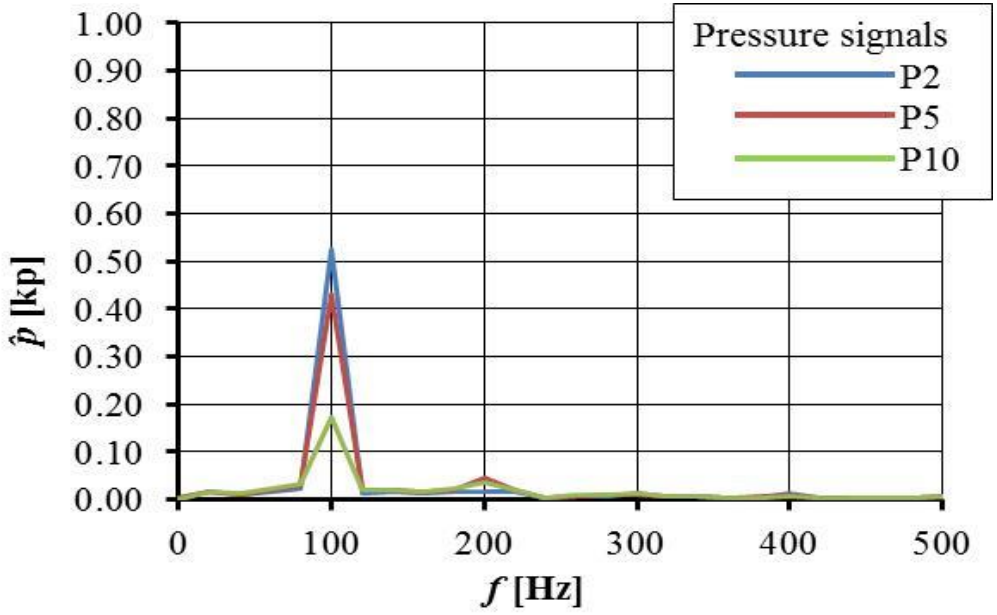


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4770	0.0205	0.0015
p5	(CFD)	0.4090	0.0097	0.0013
P10	(CFD)	0.0691	0.0031	0.0015
p2	(EFD)	0.3277	0.0103	0.0080
p5	(EFD)	0.4266	0.0152	0.0108
P10	(EFD)	0.0711	0.0142	0.0104

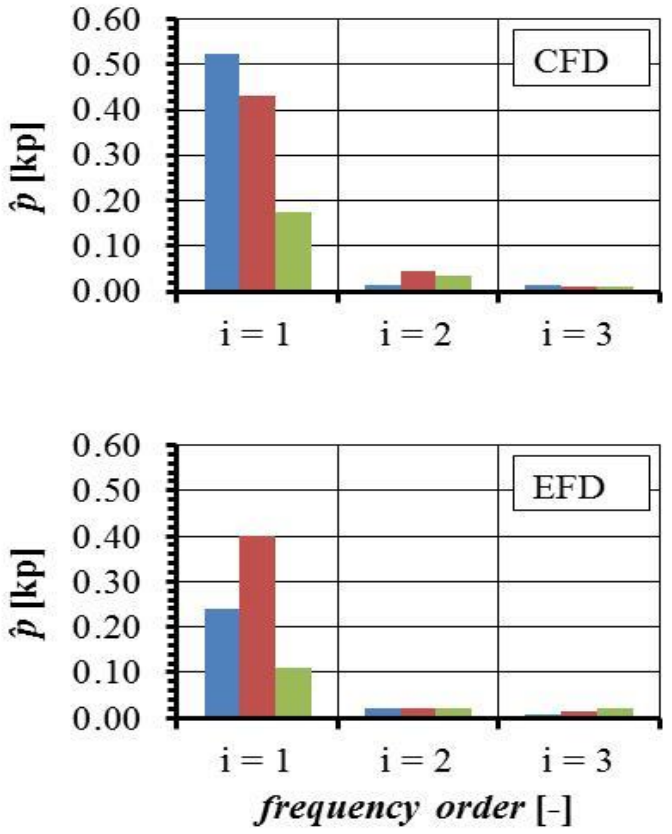


3.2.4 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, with Cavitation

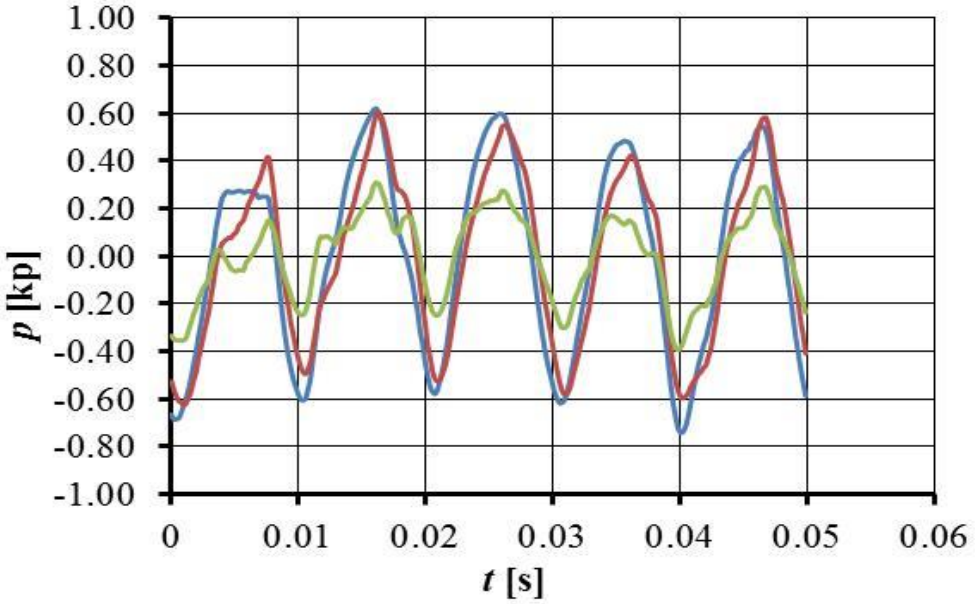


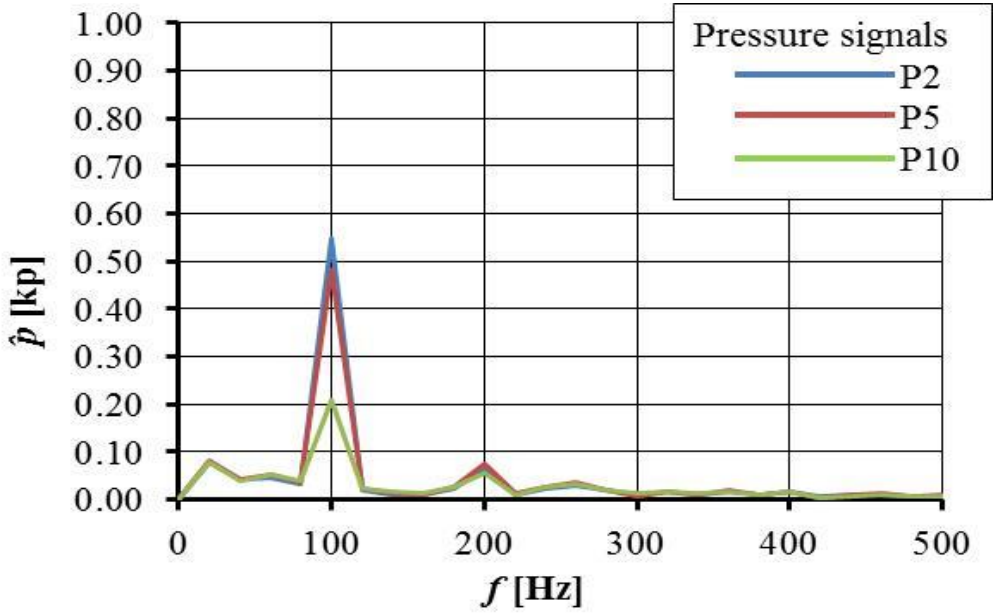


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5237	0.0155	0.0138
p5	(CFD)	0.4315	0.0468	0.0100
P10	(CFD)	0.1732	0.0343	0.0124
p2	(EFD)	0.2387	0.0206	0.0091
p5	(EFD)	0.4017	0.0196	0.0130
P10	(EFD)	0.1096	0.0227	0.0207

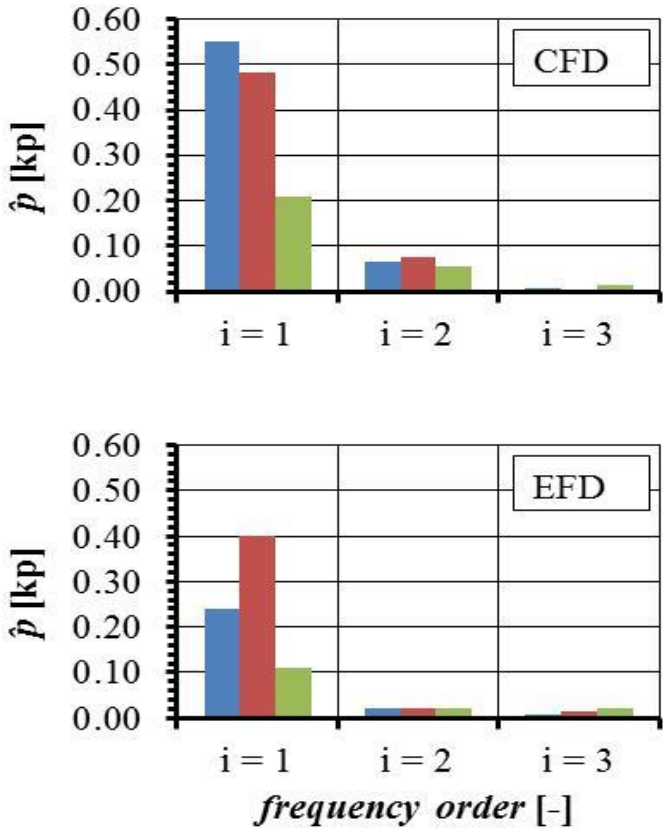


3.2.5 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, with Cavitation, Sauer

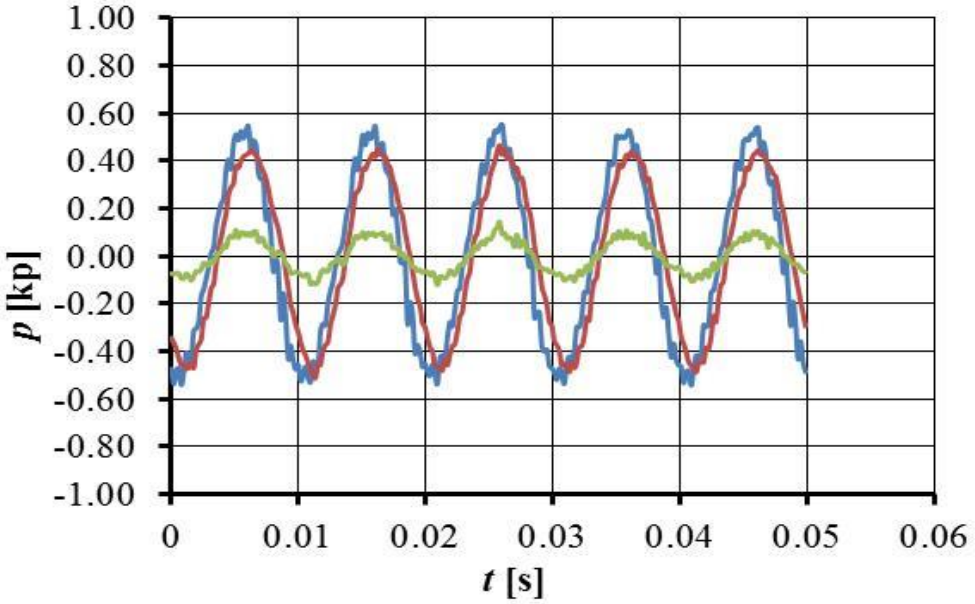


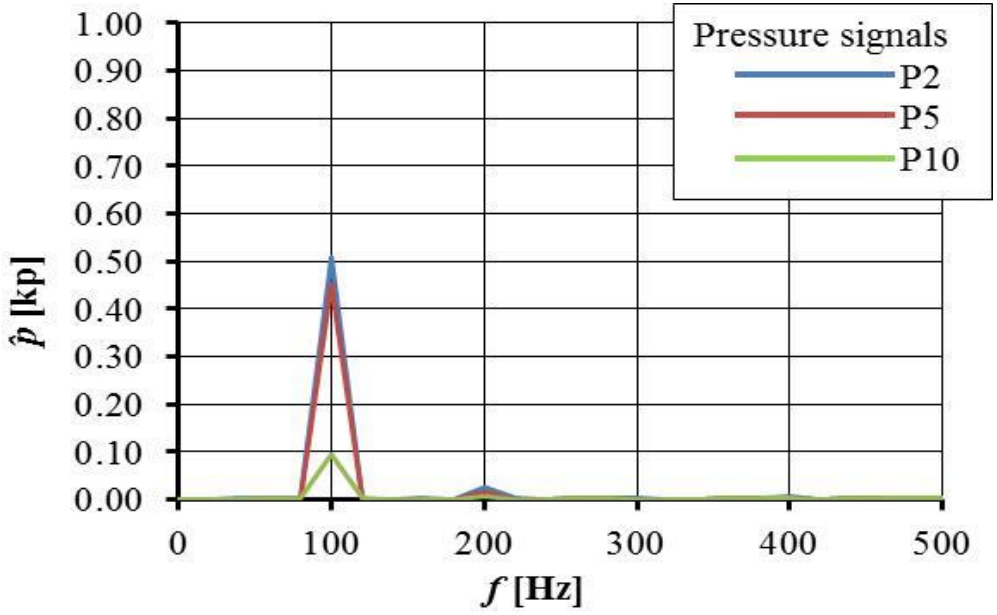


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5488	0.0651	0.0092
p5	(CFD)	0.4814	0.0750	0.0050
P10	(CFD)	0.2079	0.0566	0.0132
p2	(EFD)	0.2387	0.0206	0.0091
p5	(EFD)	0.4017	0.0196	0.0130
P10	(EFD)	0.1096	0.0227	0.0207

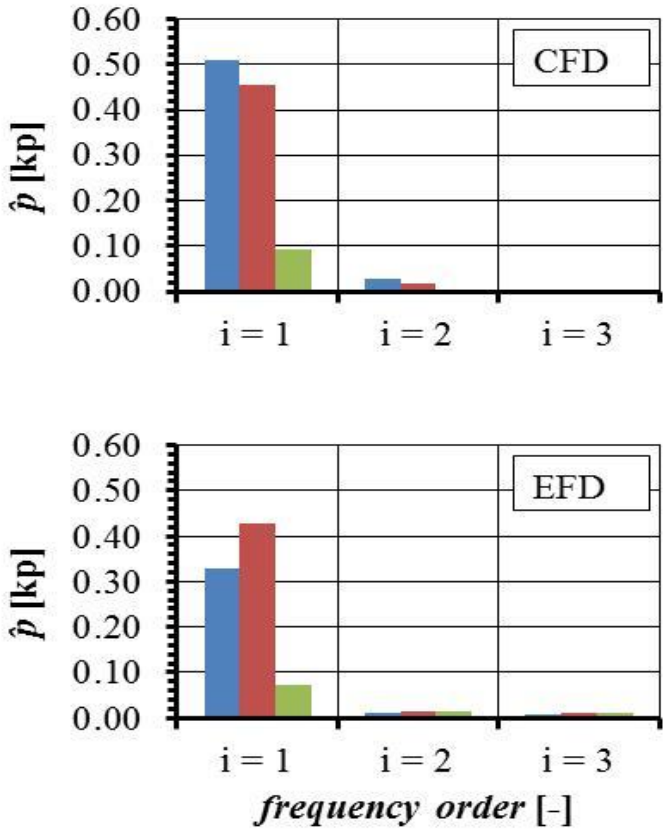


3.2.6 Pressure pulses for Ψ^{bP} = 12°: TUHH-CFX, without Cavitation

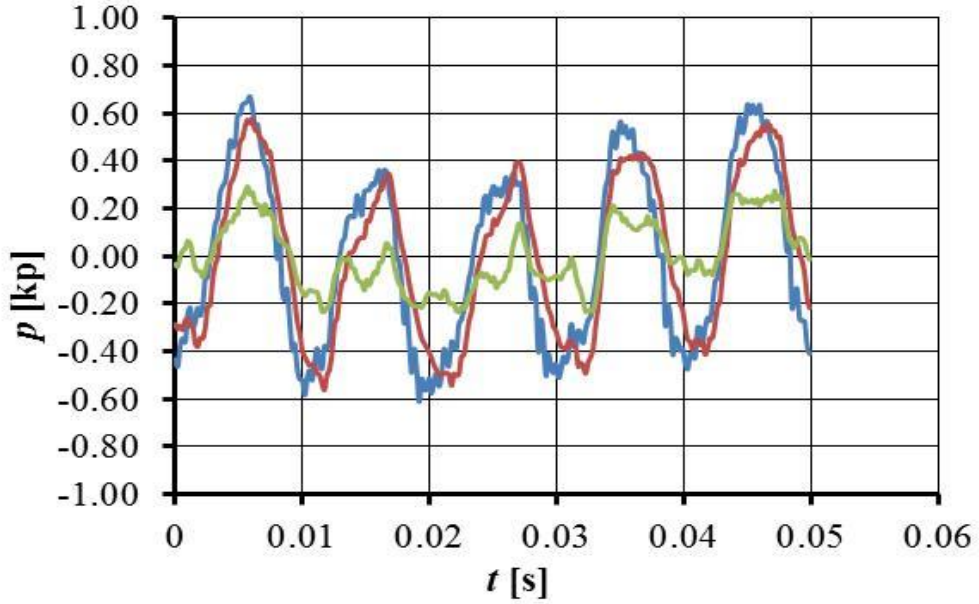


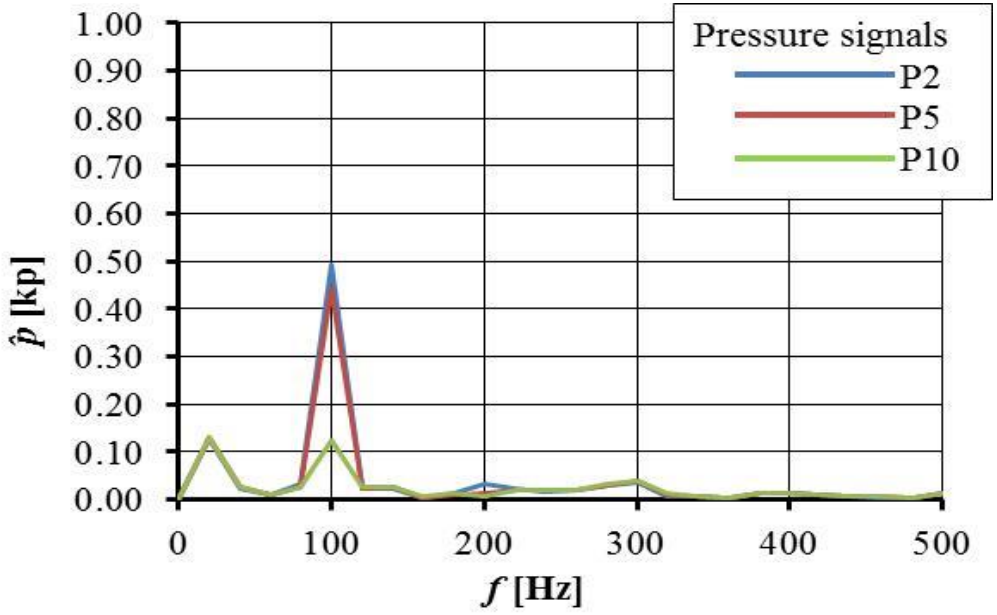


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5086	0.0266	0.0036
p5	(CFD)	0.4535	0.0167	0.0005
P10	(CFD)	0.0928	0.0048	0.0006
p2	(EFD)	0.3277	0.0103	0.0080
p5	(EFD)	0.4266	0.0152	0.0108
P10	(EFD)	0.0711	0.0142	0.0104

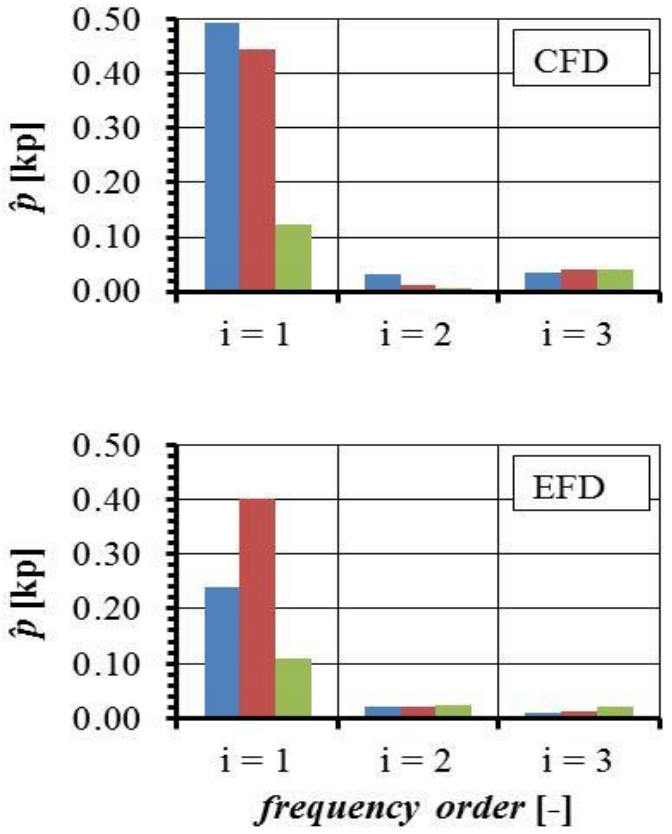


3.2.7 Pressure pulses for Ψ^{bP} = 12°: TUHH-CFX, with Cavitation

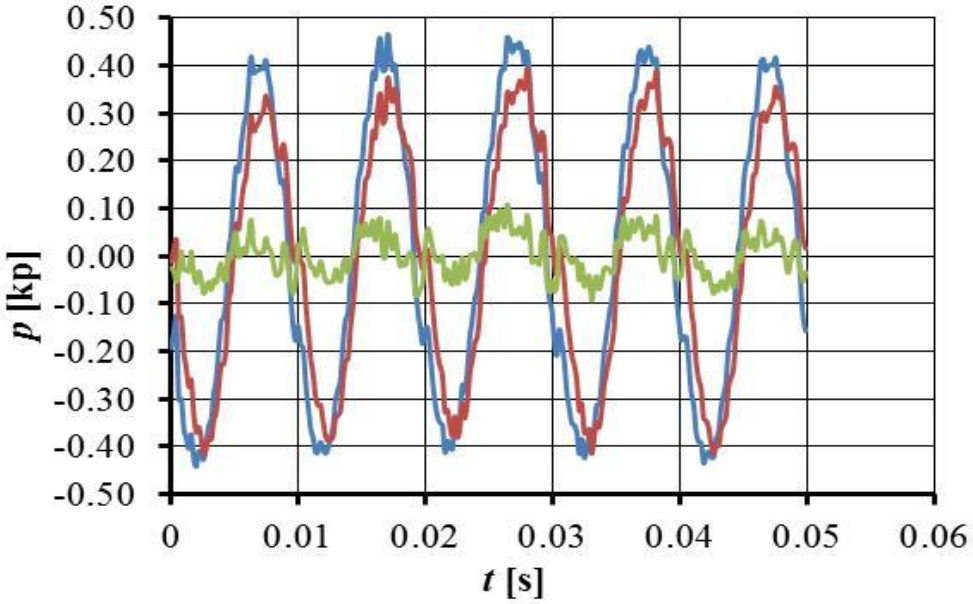


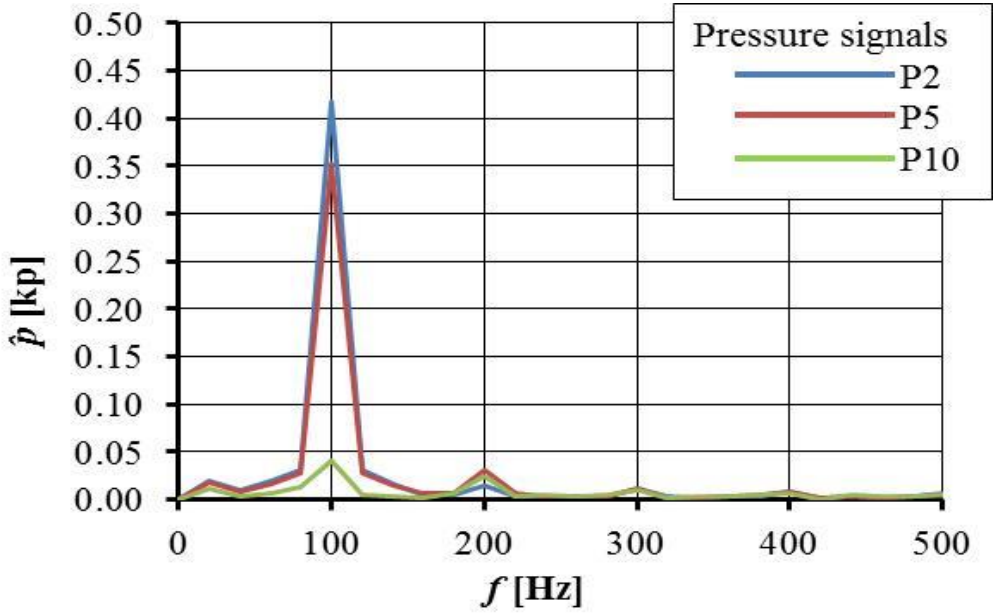


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4925	0.0309	0.0361
p5	(CFD)	0.4445	0.0119	0.0403
P10	(CFD)	0.1229	0.0074	0.0399
p2	(EFD)	0.2387	0.0206	0.0091
p5	(EFD)	0.4017	0.0196	0.0130
P10	(EFD)	0.1096	0.0227	0.0207

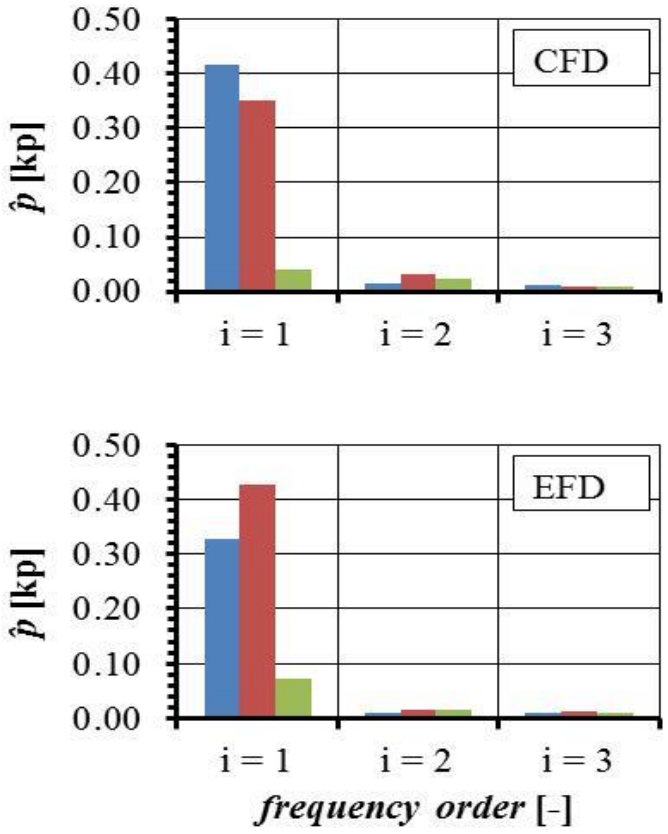


3.2.8 Pressure pulses for Ψ^{bP} = 12°: TUHH-OpenFOAM, without Cavitation

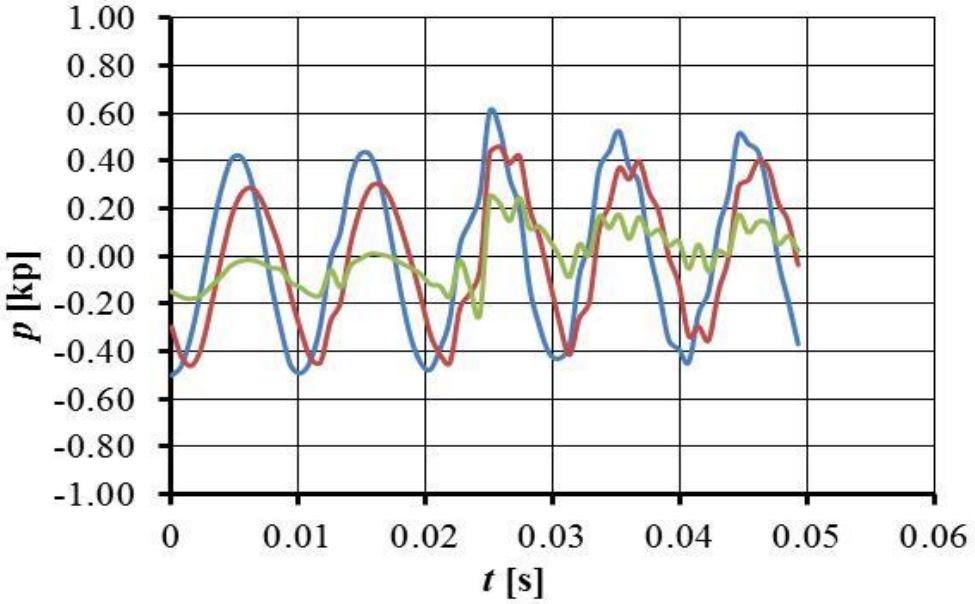


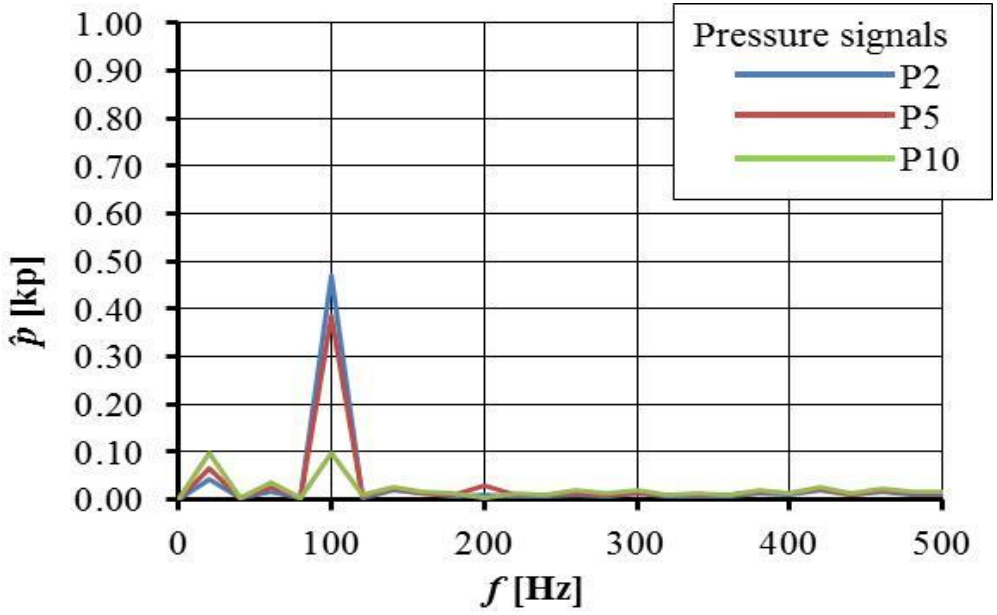


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4168	0.0152	0.0118
p5	(CFD)	0.3517	0.0315	0.0105
P10	(CFD)	0.0408	0.0239	0.0098
p2	(EFD)	0.3277	0.0103	0.0080
p5	(EFD)	0.4266	0.0152	0.0108
P10	(EFD)	0.0711	0.0142	0.0104

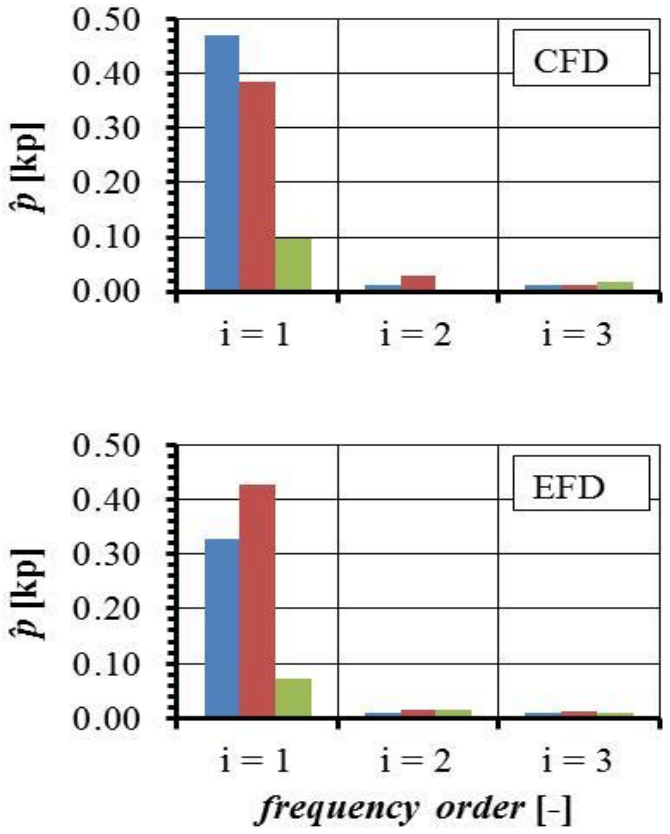


3.2.9 Pressure pulses for Ψ^{bP} = 12°: TUHH-panMARE, without Cavitation

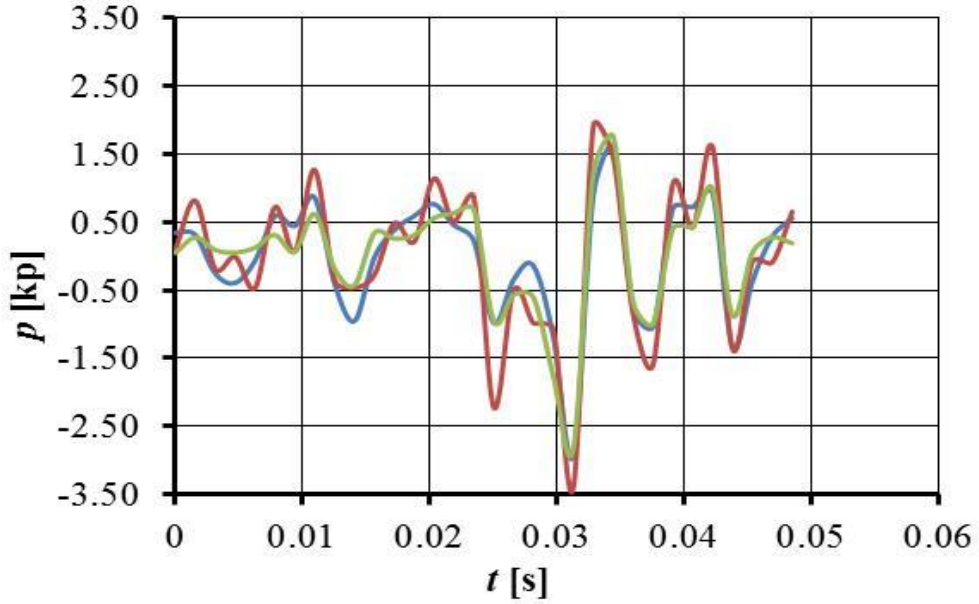


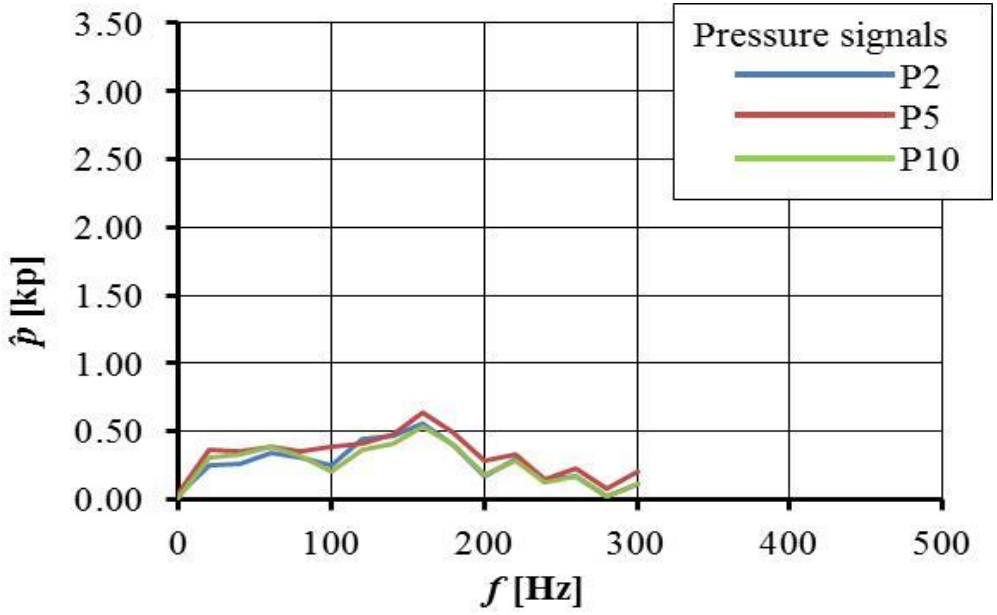


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4699	0.0109	0.0120
p5	(CFD)	0.3841	0.0285	0.0121
P10	(CFD)	0.0985	0.0044	0.0183
p2	(EFD)	0.3277	0.0103	0.0080
p5	(EFD)	0.4266	0.0152	0.0108
P10	(EFD)	0.0711	0.0142	0.0104

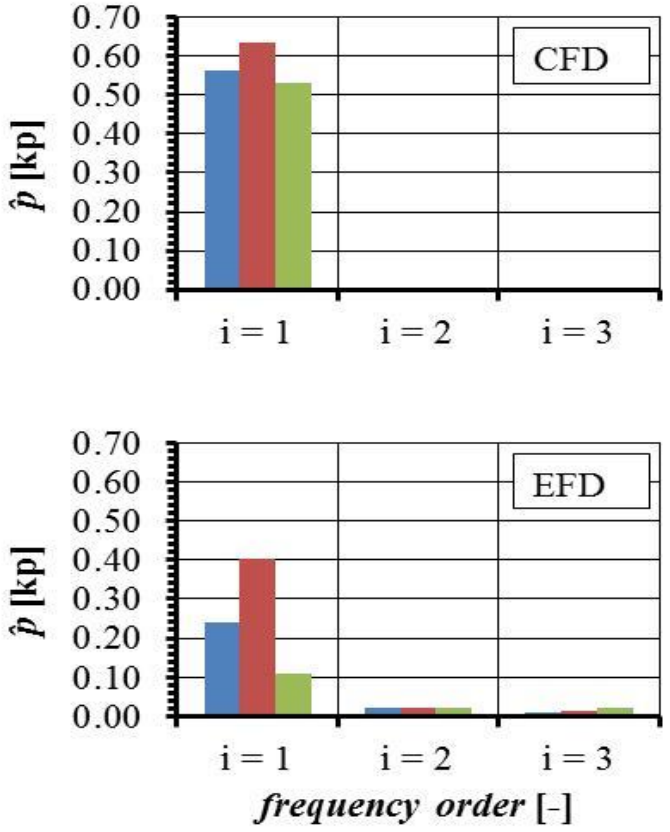


3.2.10 Pressure pulses for Ψ^{bP} = 12°: TUHH-panMARE, with Cavitation

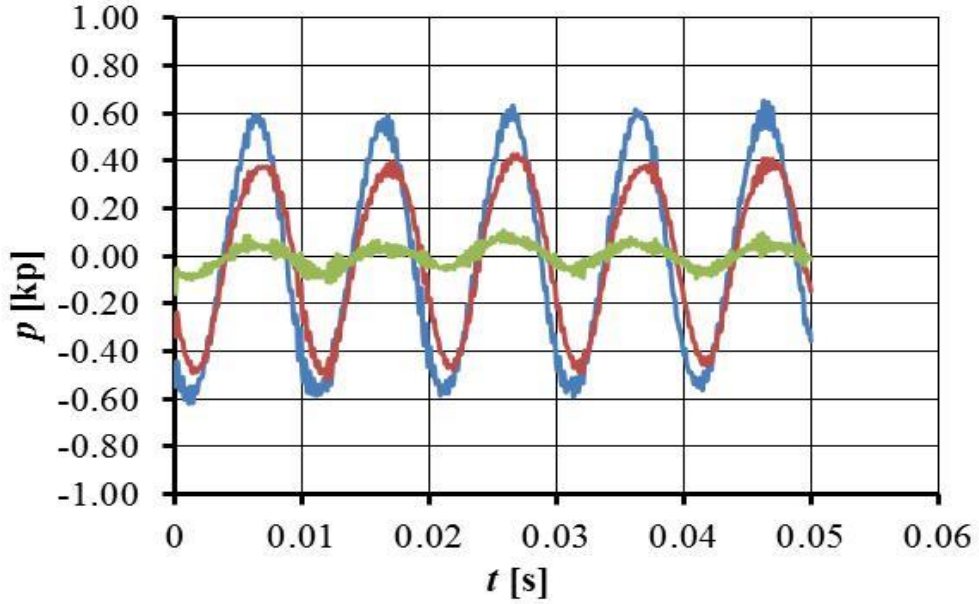


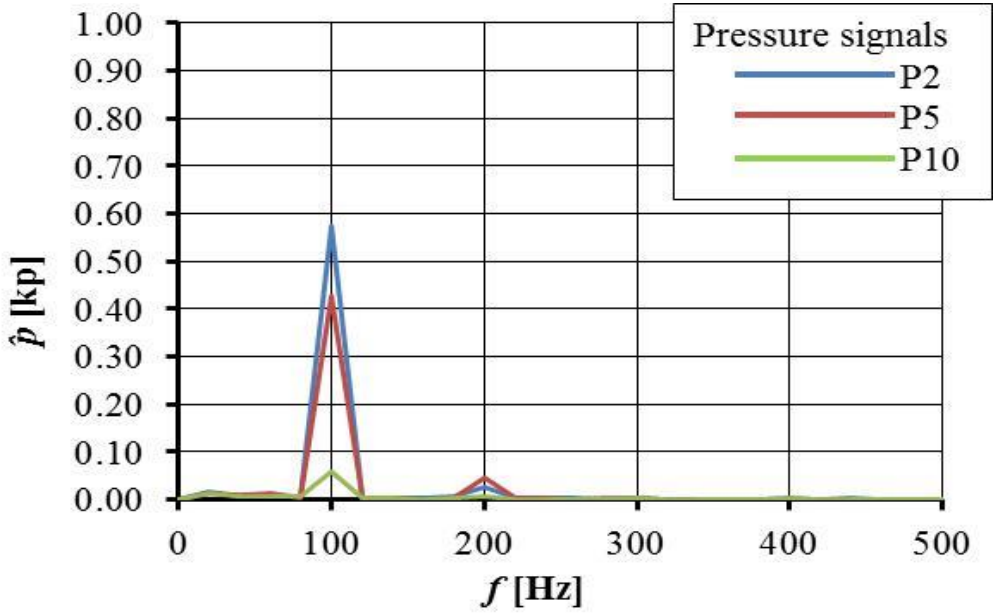


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5619	0.0000	0.0000
p5	(CFD)	0.6338	0.0000	0.0000
P10	(CFD)	0.5303	0.0000	0.0000
p2	(EFD)	0.2387	0.0206	0.0091
p5	(EFD)	0.4017	0.0196	0.0130
P10	(EFD)	0.1096	0.0227	0.0207

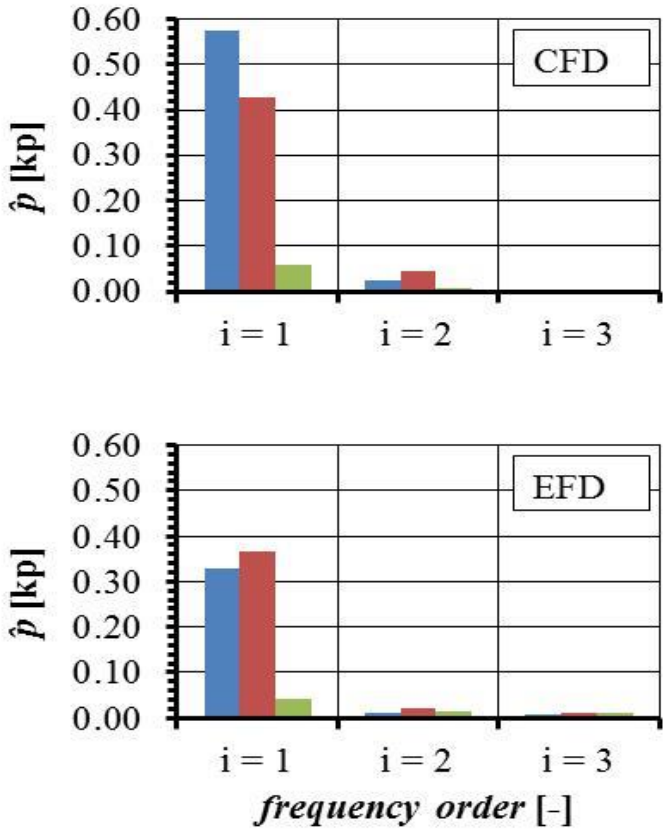


3.3.1 Pressure pulses for Ψ^{bP} = 12°: Cradle-SCTetra, without Cavitation

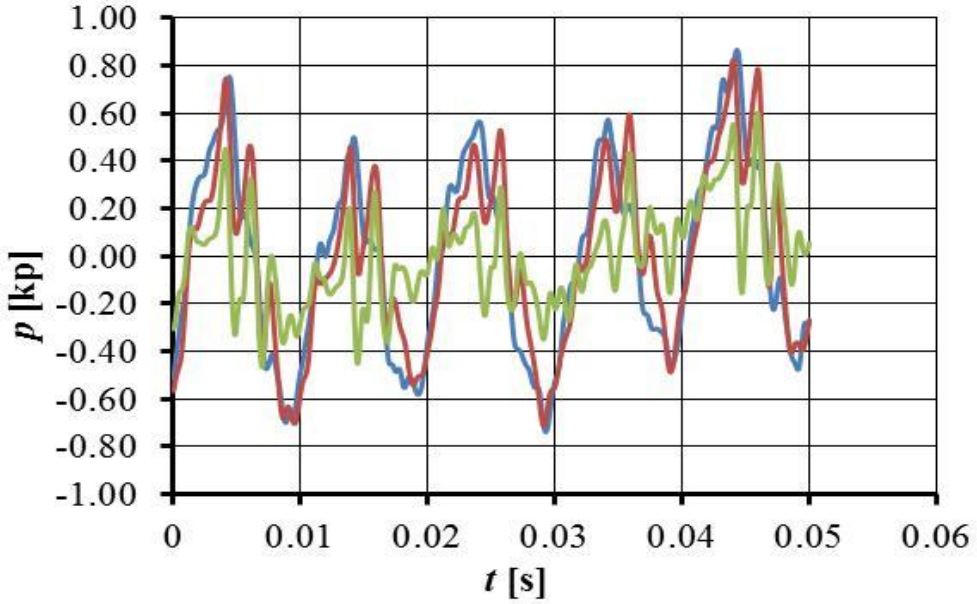


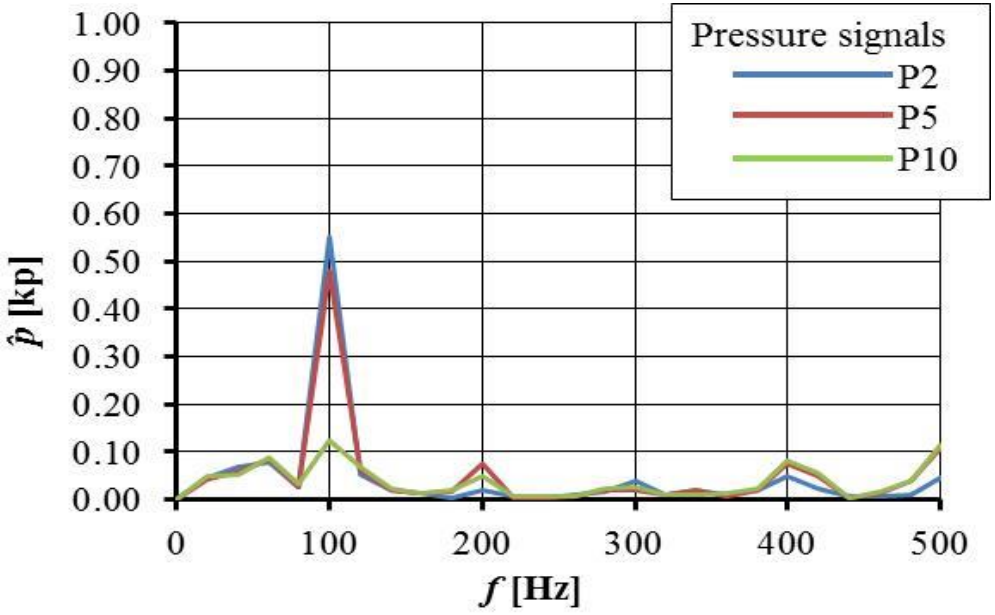


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5727	0.0256	0.0024
p5	(CFD)	0.4275	0.0457	0.0042
P10	(CFD)	0.0580	0.0078	0.0040
p2	(EFD)	0.3289	0.0122	0.0077
p5	(EFD)	0.3671	0.0204	0.0125
P10	(EFD)	0.0404	0.0141	0.0093

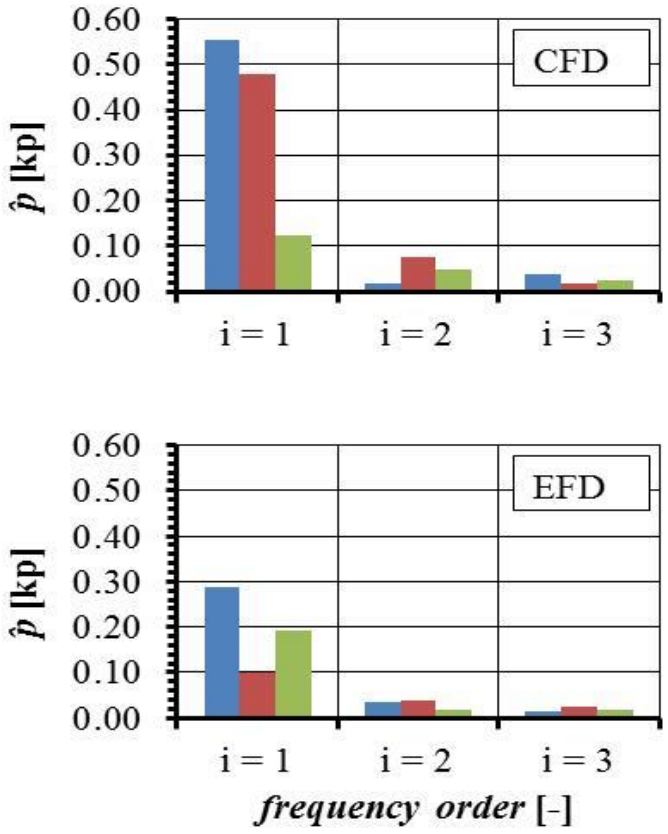


3.3.2 Pressure pulses for Ψ^{bP} = 12°: Cradle-SCTetra, with Cavitation

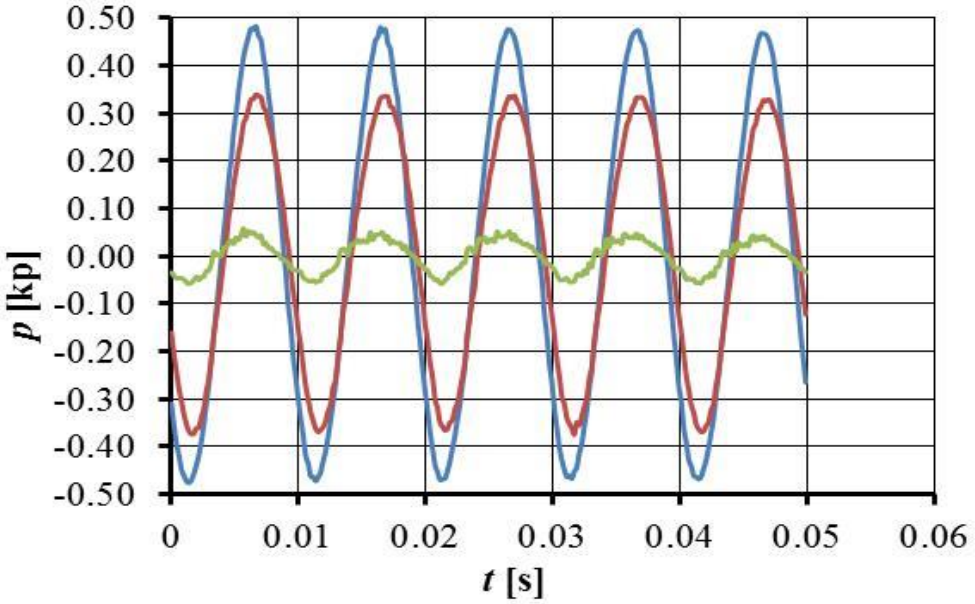


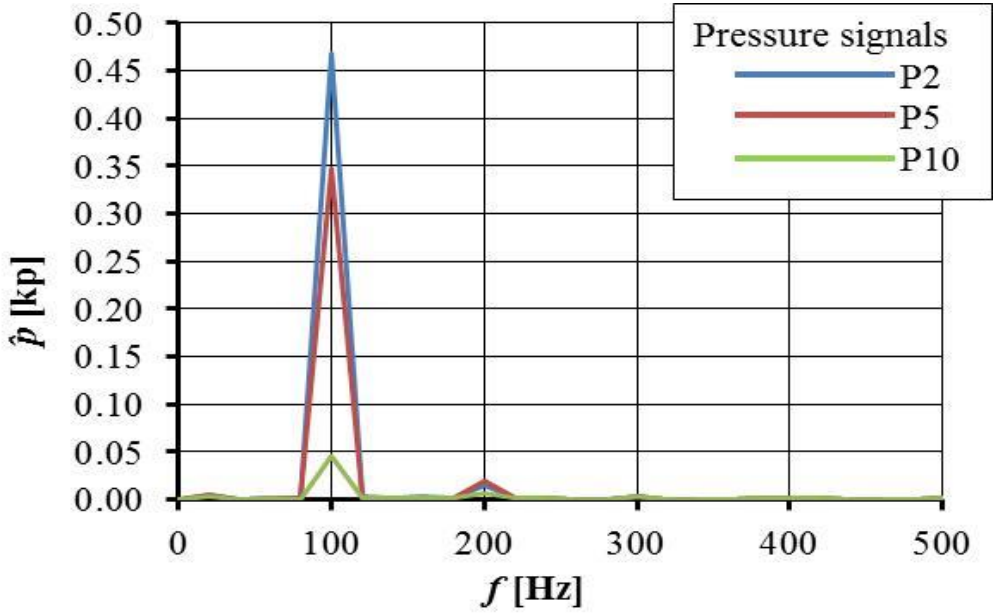


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5527	0.0194	0.0380
p5	(CFD)	0.4779	0.0758	0.0194
P10	(CFD)	0.1222	0.0497	0.0258
p2	(EFD)	0.2872	0.0355	0.0128
p5	(EFD)	0.1014	0.0395	0.0238
P10	(EFD)	0.1904	0.0183	0.0162

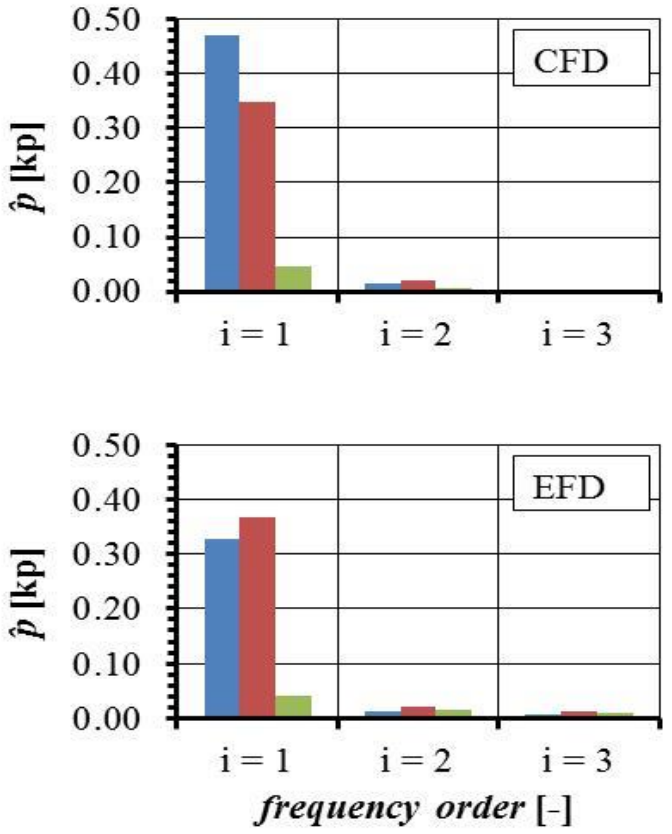


3.3.3 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, without Cavitation

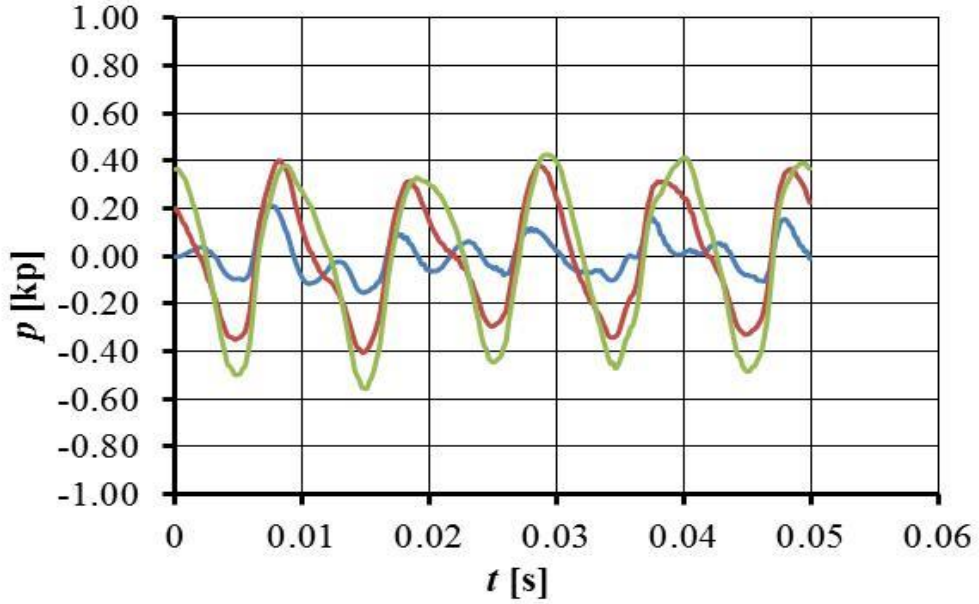


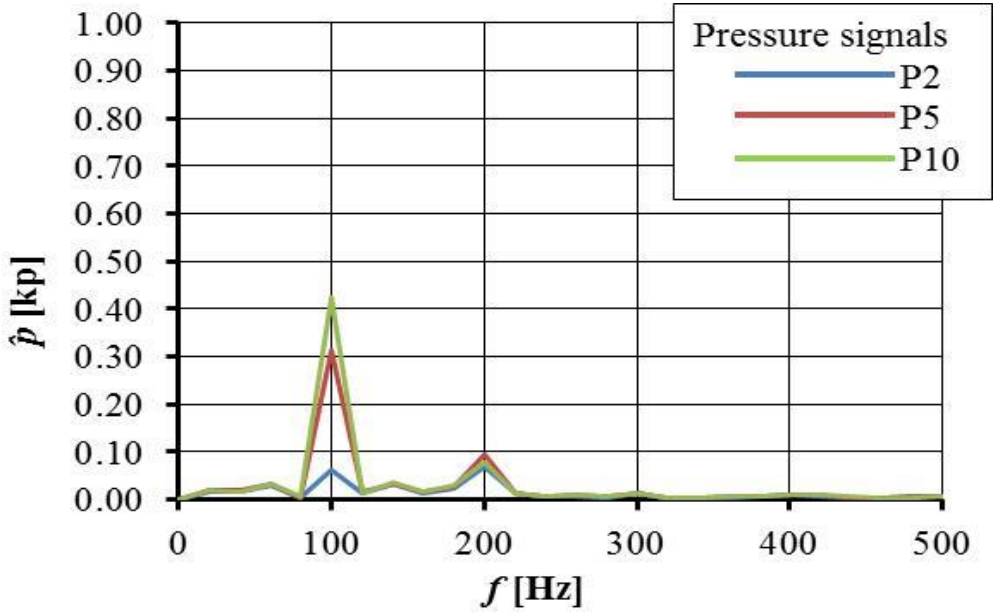


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4686	0.0142	0.0032
p5	(CFD)	0.3478	0.0197	0.0037
P10	(CFD)	0.0463	0.0058	0.0026
p2	(EFD)	0.3289	0.0122	0.0077
p5	(EFD)	0.3671	0.0204	0.0125
P10	(EFD)	0.0404	0.0141	0.0093

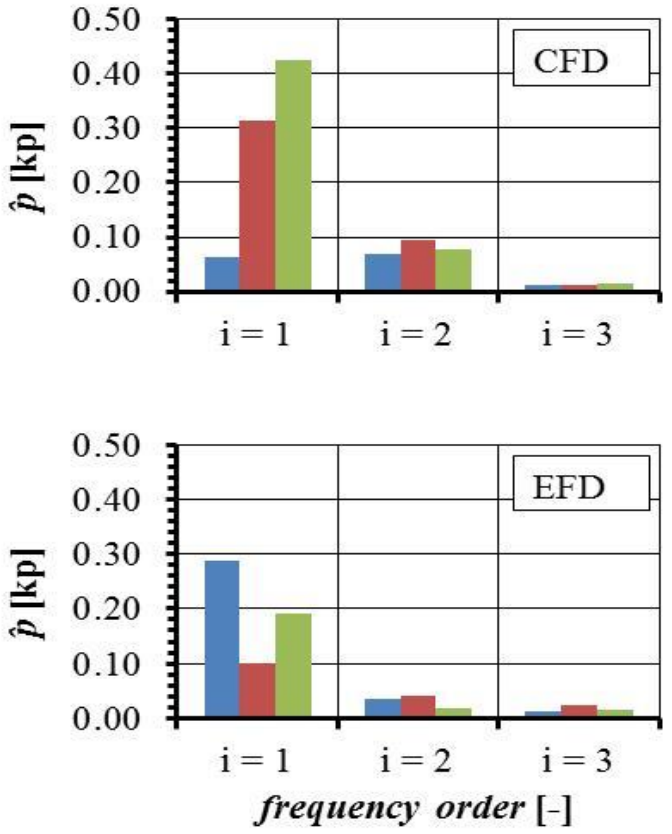


3.3.4 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, with Cavitation

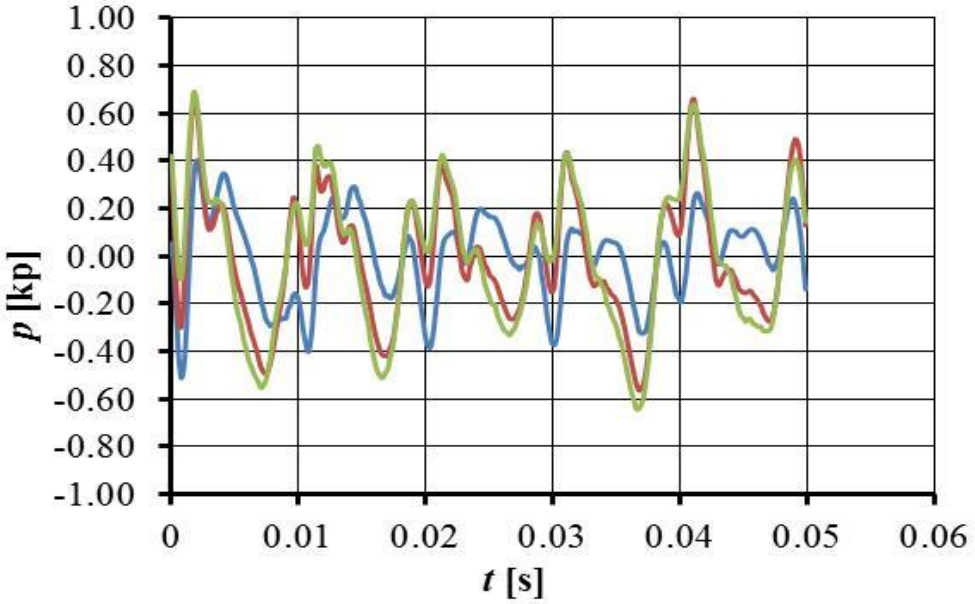


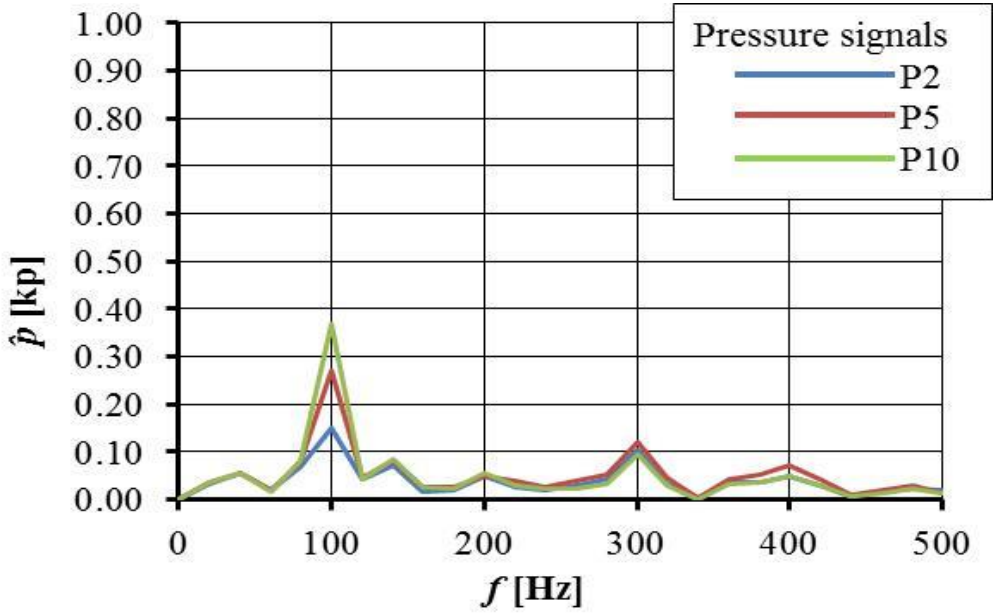


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.0620	0.0689	0.0122
p5	(CFD)	0.3128	0.0937	0.0120
P10	(CFD)	0.4232	0.0765	0.0141
p2	(EFD)	0.2872	0.0355	0.0128
p5	(EFD)	0.1014	0.0395	0.0238
P10	(EFD)	0.1904	0.0183	0.0162

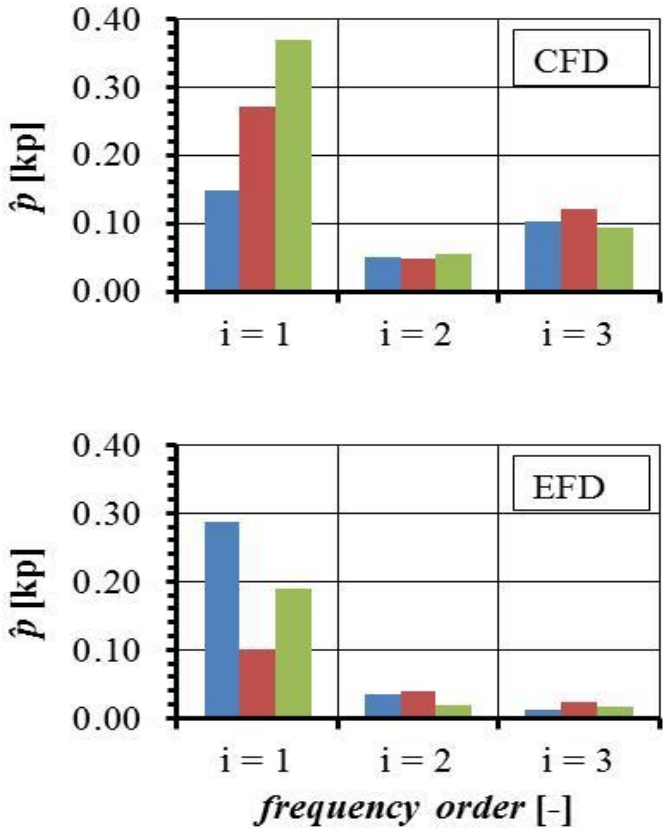


3.3.5 Pressure pulses for Ψ^{bP} = 12°: SSPA-FLUENT, with Cavitation, Sauer

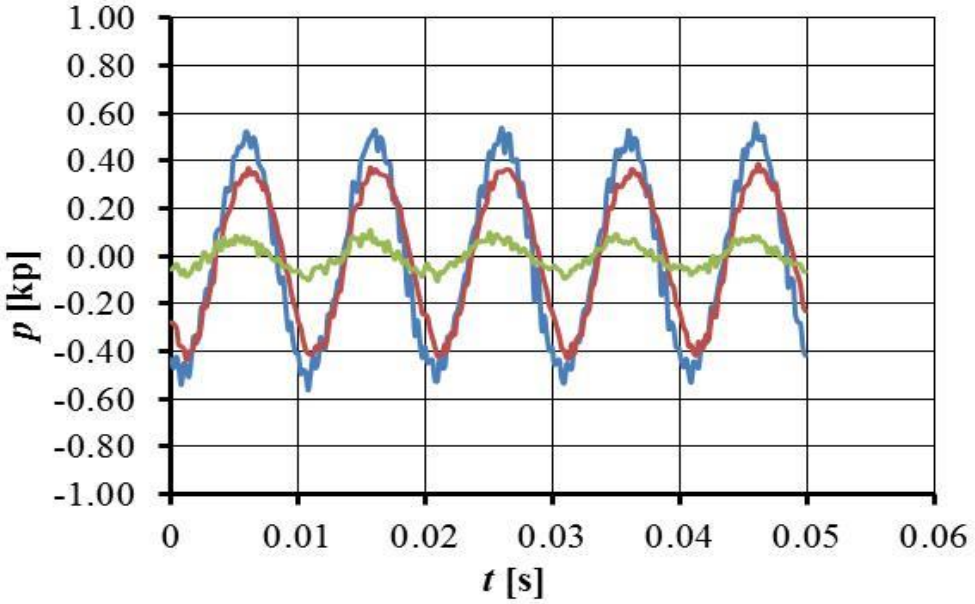


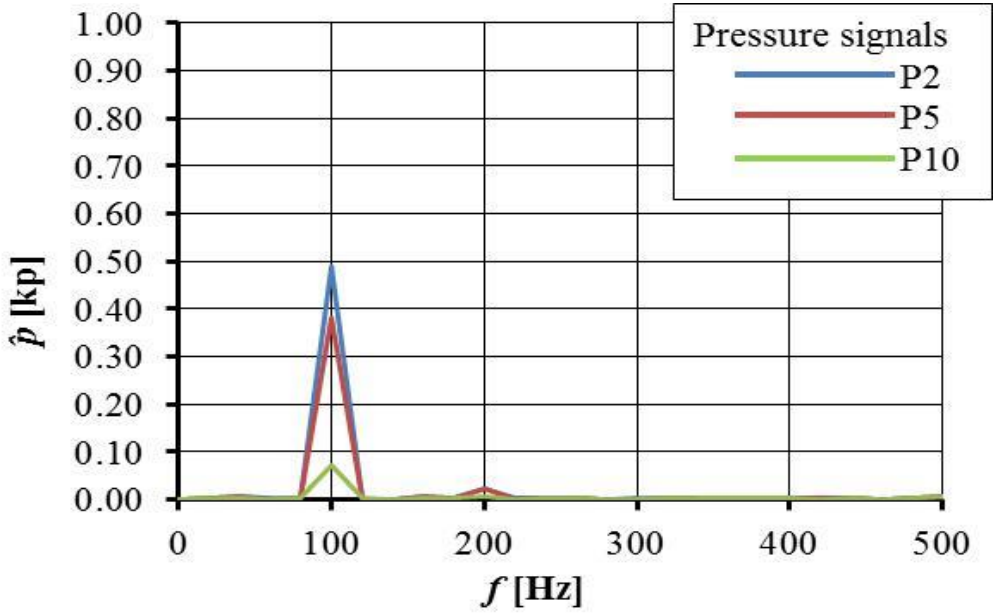


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.1492	0.0500	0.1031
p5	(CFD)	0.2719	0.0488	0.1213
P10	(CFD)	0.3690	0.0541	0.0941
p2	(EFD)	0.2872	0.0355	0.0128
p5	(EFD)	0.1014	0.0395	0.0238
P10	(EFD)	0.1904	0.0183	0.0162

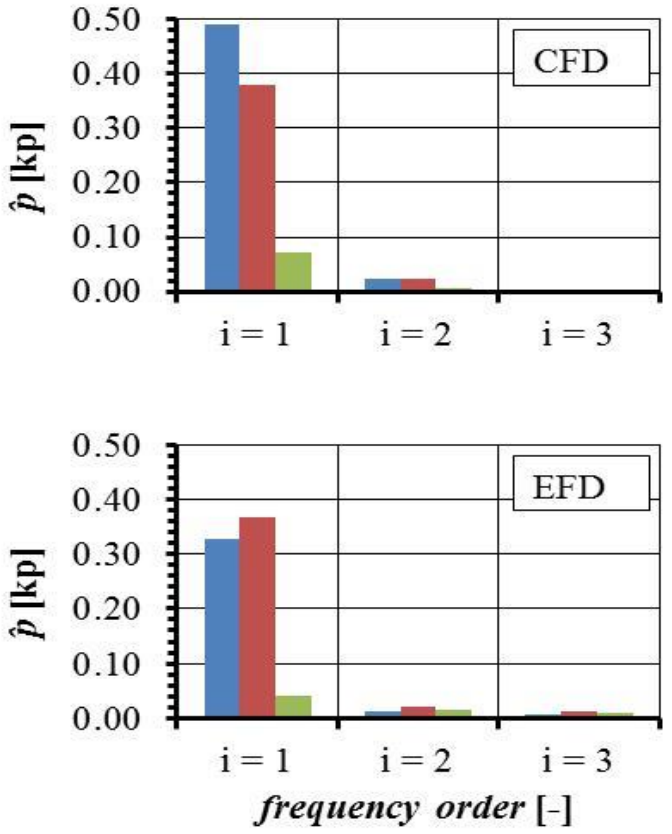


3.3.6 Pressure pulses for Ψ^{bP} = 12°: TUHH-CFX, without Cavitation

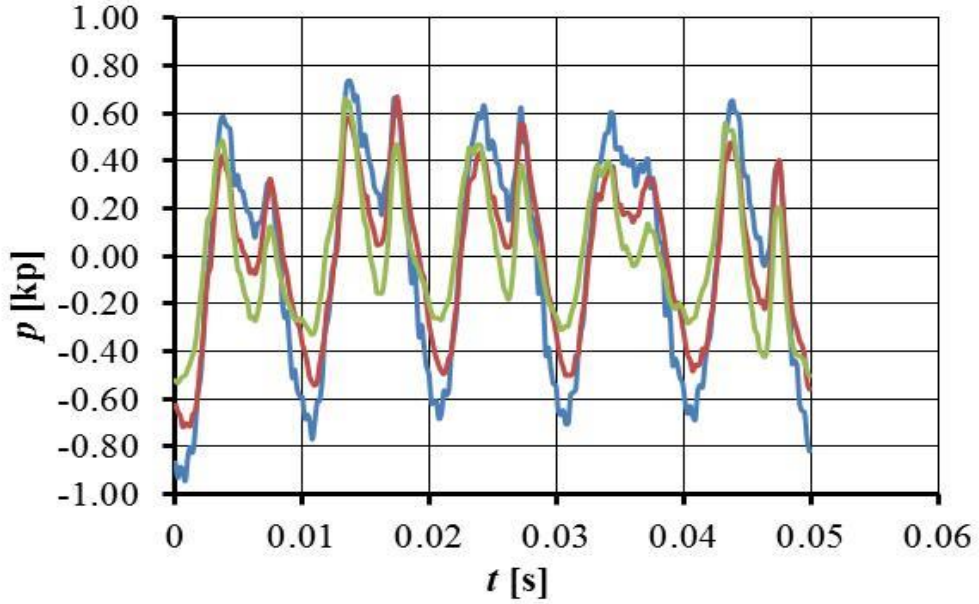


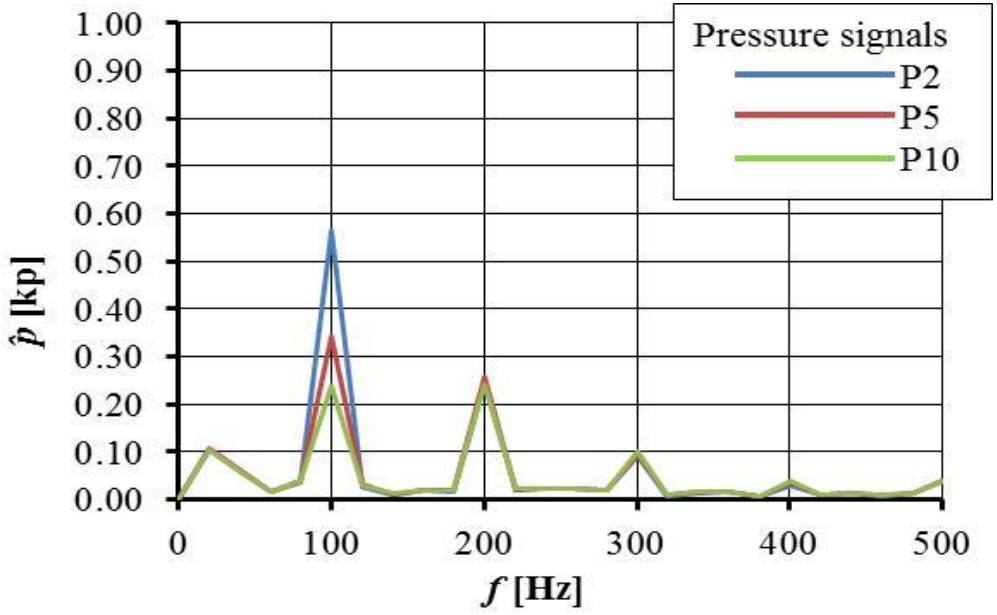


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4894	0.0230	0.0035
p5	(CFD)	0.3802	0.0227	0.0006
P10	(CFD)	0.0705	0.0065	0.0003
p2	(EFD)	0.3289	0.0122	0.0077
p5	(EFD)	0.3671	0.0204	0.0125
P10	(EFD)	0.0404	0.0141	0.0093

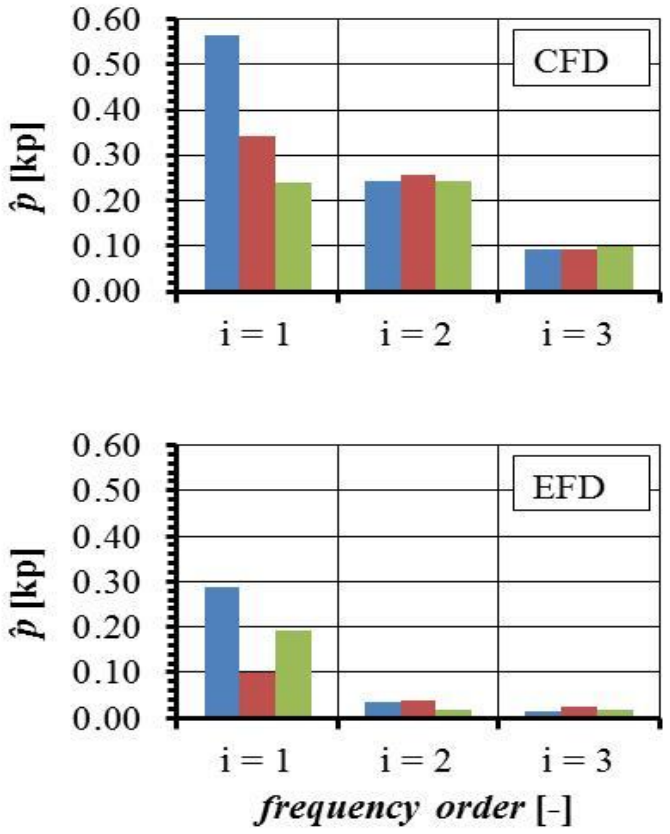


3.3.7 Pressure pulses for Ψ^{bP} = 12°: TUHH-CFX, with Cavitation

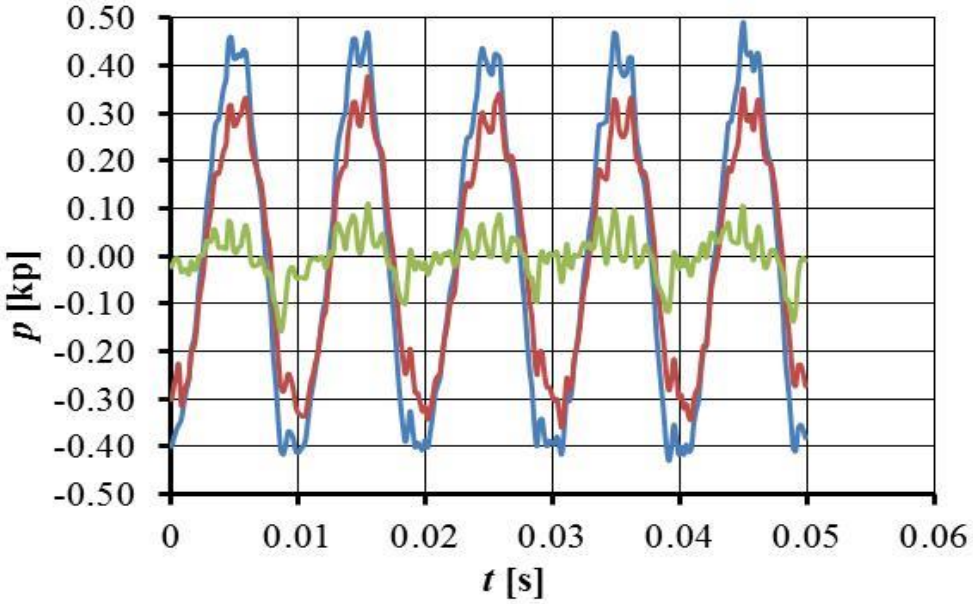


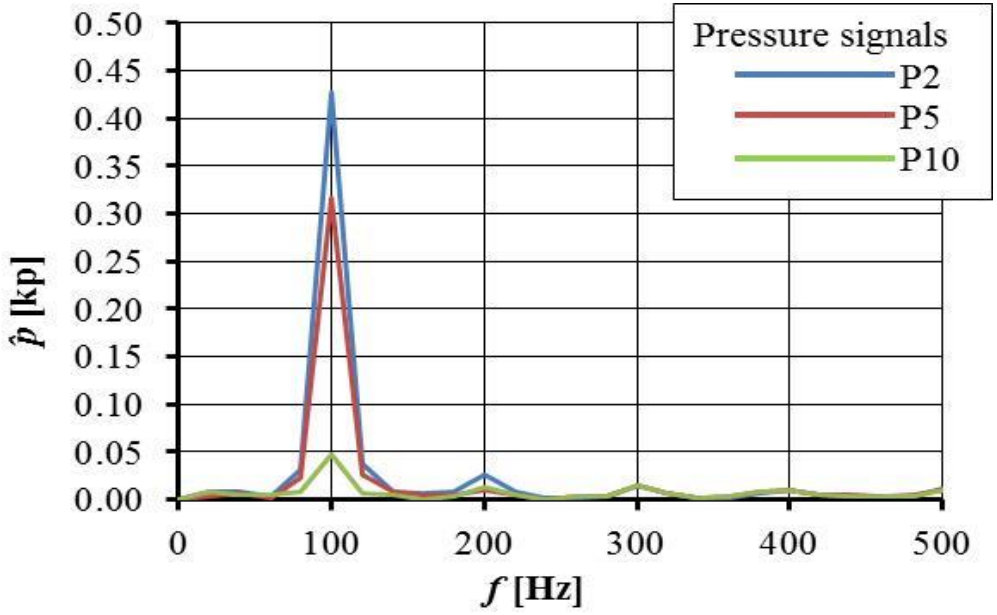


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.5653	0.2435	0.0914
p5	(CFD)	0.3419	0.2576	0.0939
P10	(CFD)	0.2392	0.2422	0.1004
p2	(EFD)	0.2872	0.0355	0.0128
p5	(EFD)	0.1014	0.0395	0.0238
P10	(EFD)	0.1904	0.0183	0.0162

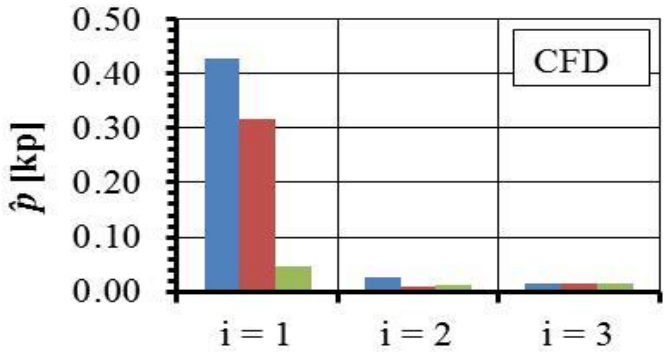


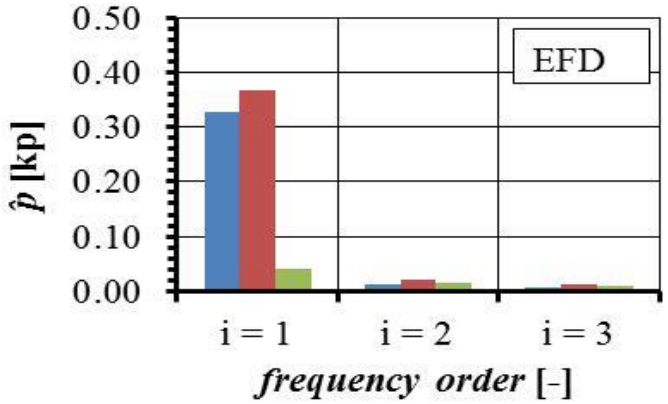
3.3.8 Pressure pulses for Ψ^{bP} = 12°: TUHH-OpenFOAM, without Cavitation



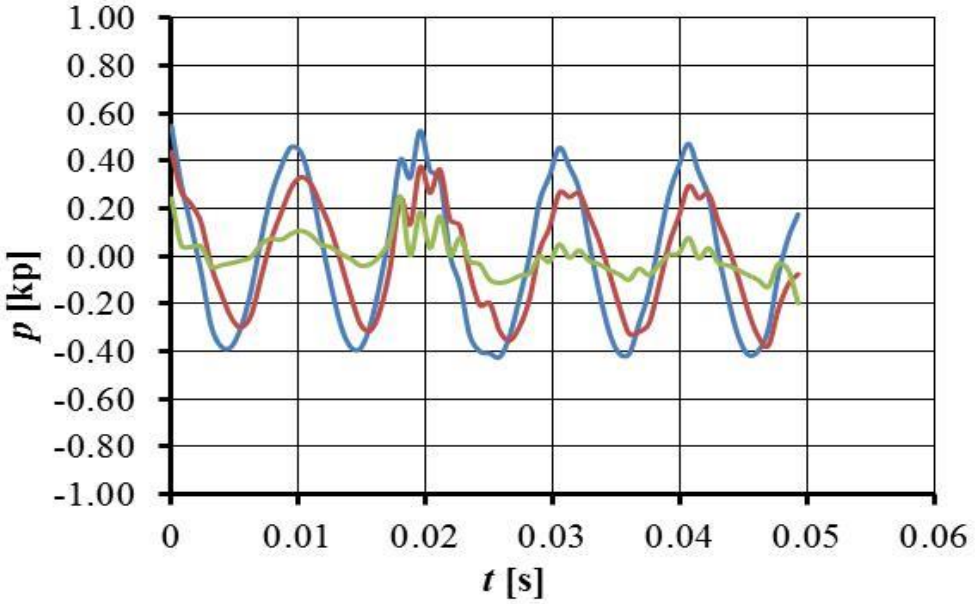


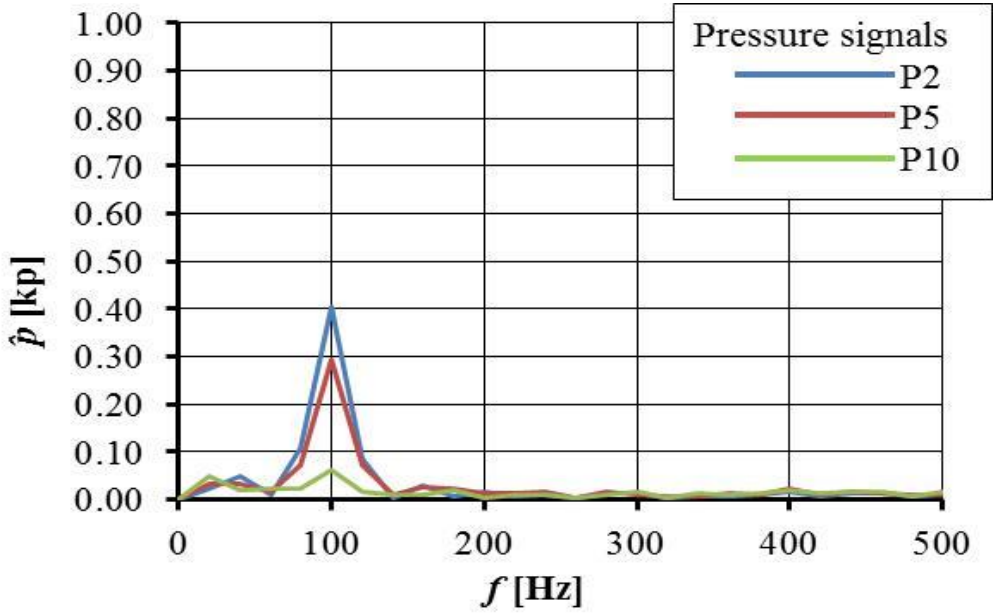
Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4281	0.0267	0.0141
p5	(CFD)	0.3169	0.0101	0.0144
P10	(CFD)	0.0470	0.0125	0.0139
p2	(EFD)	0.3289	0.0122	0.0077
p5	(EFD)	0.3671	0.0204	0.0125
P10	(EFD)	0.0404	0.0141	0.0093



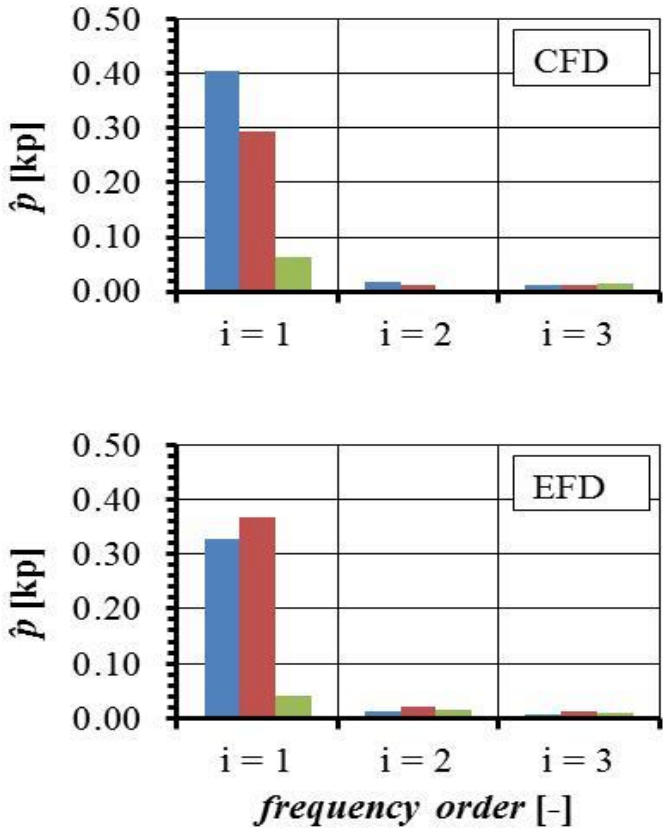


3.3.9 Pressure pulses for Ψ^{bP} = 12°: TUHH-panMARE, without Cavitation

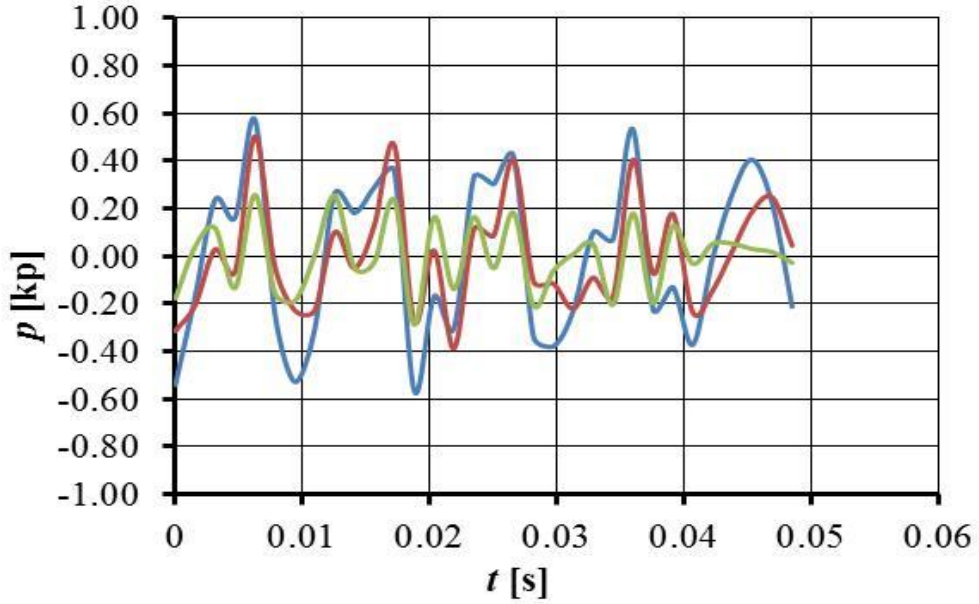


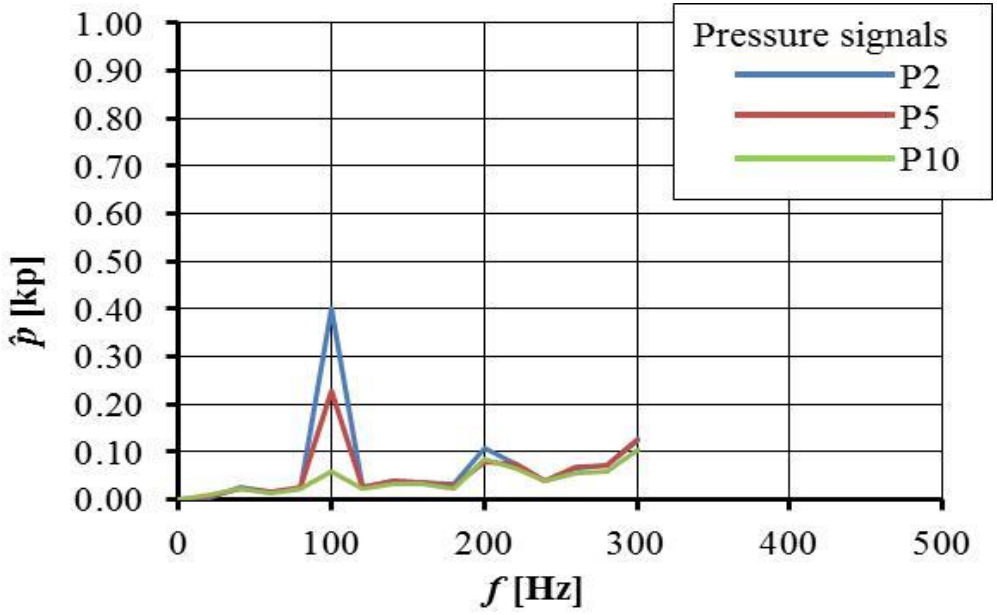


Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4050	0.0177	0.0118
p5	(CFD)	0.2946	0.0122	0.0109
P10	(CFD)	0.0630	0.0046	0.0155
p2	(EFD)	0.3289	0.0122	0.0077
p5	(EFD)	0.3671	0.0204	0.0125
P10	(EFD)	0.0404	0.0141	0.0093



3.3.10 Pressure pulses for Ψ^{bP} = 12°: TUHH-panMARE, with Cavitation





Sensor		i = 1	i = 2	i = 3
p2	(CFD)	0.4002	0.1084	0.1224
p5	(CFD)	0.2290	0.0792	0.1273
P10	(CFD)	0.0596	0.0856	0.1033
p2	(EFD)	0.2872	0.0355	0.0128
p5	(EFD)	0.1014	0.0395	0.0238
P10	(EFD)	0.1904	0.0183	0.0162