



**Health & Safety
Executive**

**OFFSHORE TECHNOLOGY
REPORT - OTO 98 103**

**A Study of the Repeatability of
Explosion Tests
Preliminary Data Report for Test 7**

Explosions in Full Scale Offshore Module Geometries

Health & Safety Executive Contract MaTSU 8847/3522

Preliminary Data Report for Test 7

Summary of Experimental Conditions	
Date	4th July 1997
Time	11:27
Test Series	B
Confinement Configuration	C1
Obstacle Configuration	O1
Ignition Position	(X:13.5, Y:5, Z:4.25)
Mean Equivalence Ratio	1.06
Water Sprays	MV25 Full Area
Polythene Cut	No

All data contained in this preliminary report is subject to final confirmation.

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Table 1: Flame Arrival Times

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-1	0.5	0.5	2.0	329.8
IP-2	6.0	0.5	2.0	290.9
IP-3	10.0	0.5	2.0	258.7
IP-4	14.0	0.5	2.0	250.1
IP-5	18.0	0.5	2.0	272.2
IP-6	22.0	0.5	2.0	305.0
IP-7	27.5	0.5	2.0	334.8
IP-8	0.5	4.0	2.0	331.5
IP-9	6.0	4.0	2.0	295.2
IP-10	14.0	4.0	2.0	225.9
IP-11	22.0	4.0	2.0	291.0
IP-12	27.5	4.0	2.0	335.1
IP-13	0.5	8.0	2.0	314.0
IP-14	6.0	8.0	2.0	312.4
IP-15	10.0	8.0	2.0	277.3
IP-16	14.0	8.0	2.0	253.7
IP-17	18.0	8.0	2.0	287.9
IP-18	22.0	8.0	2.0	-
IP-19	27.5	8.0	2.0	338.1
IP-20	0.5	11.5	2.0	351.2
IP-21	2.0	11.5	2.0	331.3
IP-22	6.0	11.5	2.0	319.0
IP-23	10.0	11.5	2.0	273.7
IP-24	14.0	11.5	2.0	261.8
IP-25	18.0	11.5	2.0	291.2
IP-26	22.0	11.5	2.0	400.1
IP-27	26.0	11.5	2.0	320.2
IP-28	27.5	11.5	2.0	288.0
IP-29	0.5	0.5	4.0	279.1
IP-30	6.0	0.5	4.0	278.1
IP-31	10.0	0.5	4.0	553.4
IP-32	14.0	0.5	4.0	236.4
IP-33	18.0	0.5	4.0	266.3

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-34	22.0	0.5	4.0	302.5
IP-35	26.0	0.5	4.0	318.7
IP-36	27.5	0.5	4.0	355.2
IP-37	0.5	4.0	4.0	306.3
IP-38	6.0	4.0	4.0	292.9
IP-39	14.0	4.0	4.0	101.9
IP-40	22.0	4.0	4.0	297.6
IP-41	26.0	4.0	4.0	316.6
IP-42	27.5	4.0	4.0	330.1
IP-43	0.5	8.0	4.0	354.3
IP-44	2.0	8.0	4.0	440.1
IP-45	6.0	8.0	4.0	351.7
IP-46	10.0	8.0	4.0	258.5
IP-47	14.0	8.0	4.0	230.5
IP-48	18.0	8.0	4.0	263.3
IP-49	22.0	8.0	4.0	290.1
IP-50	26.0	8.0	4.0	-
IP-51	27.5	8.0	4.0	347.3
IP-52	26.0	10.0	4.0	355.1
IP-53	27.5	10.0	4.0	352.6
IP-54	0.5	11.5	4.0	358.0
IP-55	2.0	11.5	4.0	349.4
IP-56	6.0	11.5	4.0	334.9
IP-57	10.0	11.5	4.0	291.4
IP-58	14.0	11.5	4.0	291.9
IP-59	18.0	11.5	4.0	339.6
IP-60	22.0	11.5	4.0	314.8
IP-61	26.0	11.5	4.0	332.5
IP-62	27.5	11.5	4.0	355.9
IP-63	0.5	0.5	6.0	339.2
IP-64	6.0	0.5	6.0	298.9
IP-65	10.0	0.5	6.0	271.3
IP-66	14.0	0.5	6.0	249.0
IP-67	18.0	0.5	6.0	272.8

Ionisation Probe	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Flame Arrival Time (msec)
IP-68	22.0	0.5	6.0	301.4
IP-69	27.5	0.5	6.0	-
IP-70	0.5	4.0	6.0	342.2
IP-71	6.0	4.0	6.0	279.4
IP-72	14.0	4.0	6.3	215.7
IP-73	22.0	4.0	6.0	291.9
IP-74	27.5	4.0	6.0	332.5
IP-75	0.5	8.0	6.0	336.1
IP-76	6.0	8.0	6.0	300.5
IP-77	10.0	8.0	6.0	248.4
IP-78	14.0	8.0	6.0	-
IP-79	18.0	8.0	6.0	260.9
IP-80	22.0	8.0	6.0	289.4
IP-81	27.5	8.0	6.0	332.9
IP-82	0.5	11.5	6.0	358.0
IP-83	2.0	11.5	6.0	329.1
IP-84	6.0	11.5	6.0	292.4
IP-85	10.0	11.5	6.0	291.2
IP-86	14.0	11.5	6.0	-
IP-87	18.0	11.5	6.0	287.6
IP-88	22.0	11.5	6.0	318.8
IP-89	26.0	11.5	6.0	303.5
IP-90	27.5	11.5	6.0	329.6

Table 2: Internal Overpressures

Pressure Transducer	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Maximum Overpressure (mbar)	1.5ms Running Average			
					Maximum Overpressure (mbar)	Time of Arrival (ms)	Idealised Profile Representation	
							Rise Time (ms)	Duration (ms)
PI-1	0.8	0.5	0.0	240	234	318.8	68.6	116.5
PI-2	6.0	0.5	0.0	297	293	294.5	62.3	148.2
PI-3	12.5	0.5	0.0	244	240	293.7	85.8	179.5
PI-4	22.0	0.5	0.0	306	301	305.0	63.6	136.5
PI-5	27.5	0.5	0.0	291	284	323.7	67.7	115.3
PI-6	0.5	6.0	0.0	445	426	349.8	93.9	104.6
PI-7	9.0	6.0	0.0	250	247	298.3	83.2	179.8
PI-8	14.0	6.0	0.0	259	251	291.8	84.4	147.5
PI-9	21.0	6.0	0.0	274	263	318.4	93.5	154.6
PI-10	27.5	6.0	0.0	349	331	336.8	82.6	117.9
PI-11	0.5	11.5	0.0	362	357	355.6	97.6	113.5
PI-12	12.3	11.5	0.0	271	266	292.6	70.7	172.2
PI-13	27.5	11.5	0.0	322	313	354.3	96.5	108.8
PI-14	0.5	0.5	4.0	252	240	328.5	84.6	122.8
PI-15	4.5	0.6	4.0	257	225	292.0	57.6	140.4
PI-16	11.2	0.0	5.5	239	212	288.4	83.0	188.2
PI-17	12.0	0.5	4.0	198	195	288.9	90.8	194.1
PI-18	22.0	0.5	4.0	224	219	304.8	74.0	151.4
PI-19	27.5	0.5	4.0	291	276	349.4	98.0	120.6
PI-20	10.2	4.0	4.0	222	217	299.6	99.4	192.3
PI-21	0.5	7.0	4.0	277	269	324.0	79.2	126.1
PI-22	18.0	8.0	4.0	232	228	300.9	84.7	171.6
PI-23	27.5	6.0	4.0	284	274	327.2	75.0	125.9
PI-24	0.5	11.5	4.0	285	273	328.6	76.6	124.0
PI-25	10.0	11.5	4.0	207	199	293.4	74.4	176.6
PI-26	18.0	11.5	4.0	234	229	296.5	67.6	158.7
PI-27	27.5	11.5	4.0	297	279	326.6	69.8	115.6
PI-28	0.8	0.8	8.0	311	294	326.2	73.7	113.6
PI-29	13.9	1.7	8.0	212	206	286.6	78.7	184.5
PI-30	26.1	1.7	8.0	306	258	346.7	99.9	125.8
PI-31	5.9	5.0	8.0	350	340	292.4	58.9	154.2
PI-32	18.9	5.0	8.0	273	268	289.1	67.3	163.6
PI-33	1.1	11.1	8.0	209	183	322.1	69.1	118.2
PI-34	12.8	11.2	8.0	251	244	292.0	70.4	175.8
PI-35	26.1	11.3	8.0	385	346	326.2	69.9	119.3

Table 3 : External Overpressures

Pressure Transducer	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Maximum Overpressure (mbar)	Maximum Overpressure 1.5ms Running Average (mbar)
PE-1	34.0	6.0	1.0	-	-
PE-2	40.0	6.0	1.0	228	213
PE-3	52.0	6.0	1.0	229	201
PE-4	76.0	6.0	1.0	130	108
PE-5	47.2	25.2	1.0	176	153
PE-6	61.3	39.3	1.0	107	95
PE-7	14.0	18.0	1.0	123	119
PE-8	14.0	24.0	1.0	86	83
PE-9	14.0	36.0	1.0	107	105
PE-10	14.0	60.0	1.0	-	-
PE-11	-21.2	25.2	1.0	146	133

Table 4: Gas Concentrations

Measuring Position	X Co-ord (m)	Y Co-ord (m)	Z Co-ord (m)	Natural Gas Concentration (%)
1	24.1	4.4	1.4	9.4
2	12.0	8.3	0.8	9.4
3	1.0	2.4	1.1	9.4
4	7.7	9.8	3.5	9.4
5	14.1	5.2	4.3	9.4
6	26.2	2.0	5.3	9.4
7	7.6	8.1	4.9	9.2
8	19.8	7.8	7.7	9.4

Table 5: Weather Conditions

Air Temperature (°C)	Atmospheric Pressure (mbar)	Wind Speed (ms ⁻¹)	Wind Direction (° from Magnetic North)
14.6	979	2.8	87

Table 6: Confinement Configuration

Confinement Configuration	Rig Face*	Confinement
C1	North	Open
	East	Open
	South	Open
	West	Open

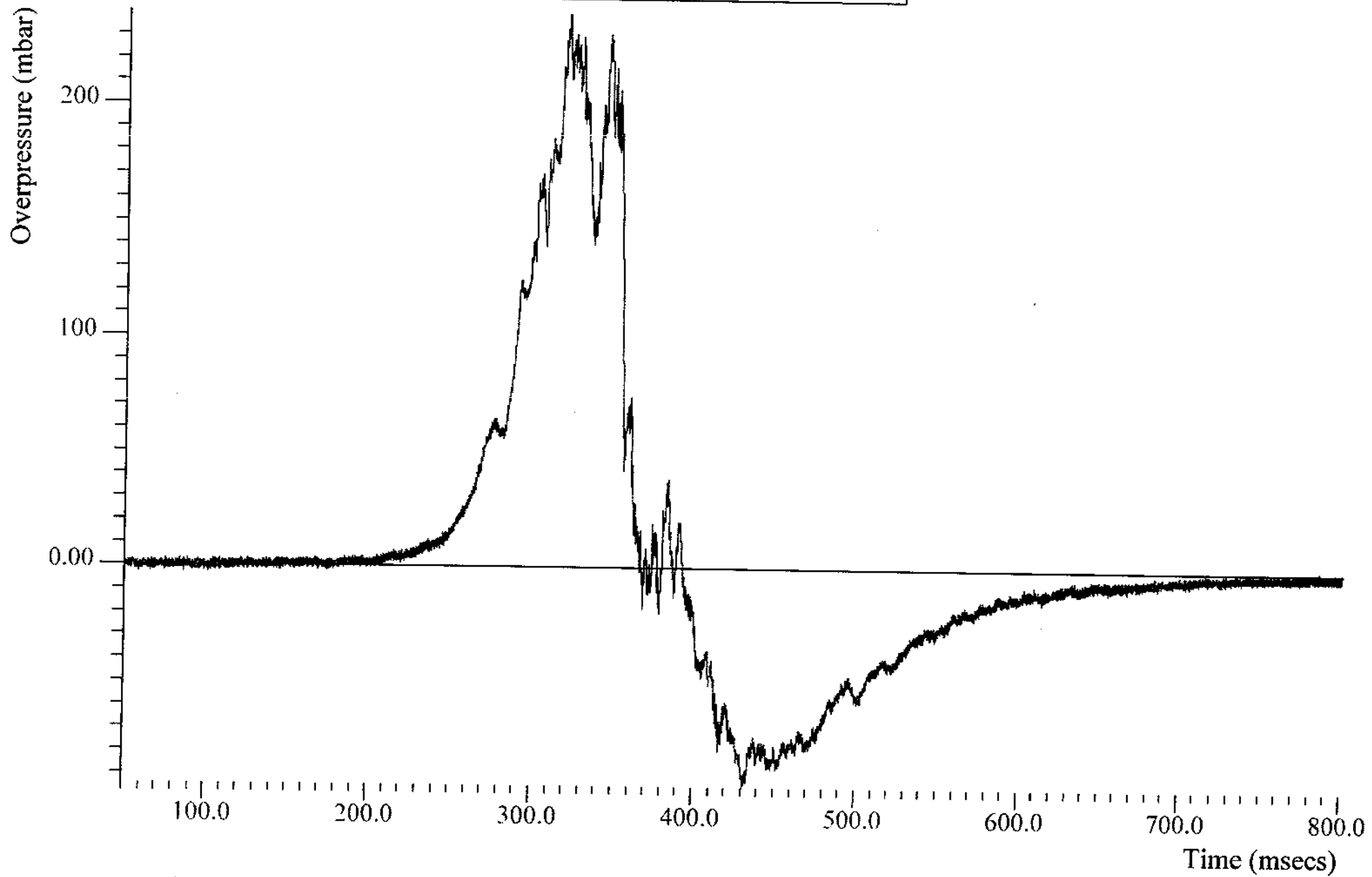
* - Origin is at the junction of the West and South faces at ground level. Roof and floor also confined.

Table 7: Water Deluge Configuration

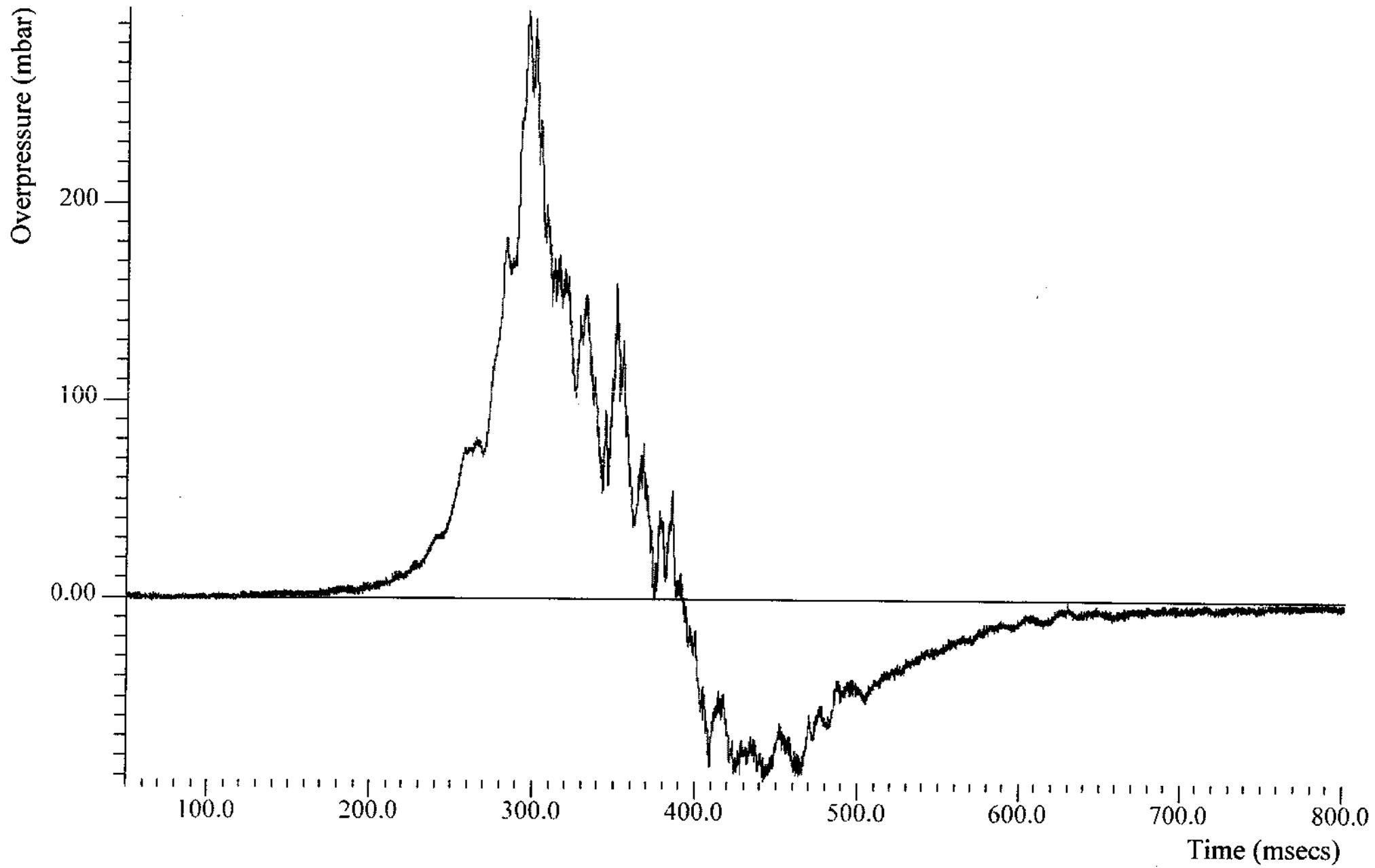
Nozzle Type	MV25
Number of Nozzles in Mezzanine Deck	75
Number of Nozzles in Cellar Deck	17
Water Inlet Pressure (barg)	-
Water Pressure at Nozzle (barg)	6.7
Total Water Flowrate (l min ⁻¹)	7177
Area Coverage - Cellar Deck (l min ⁻¹ m ⁻²)	21.4

Appendix A: Internal Overpressure Profiles

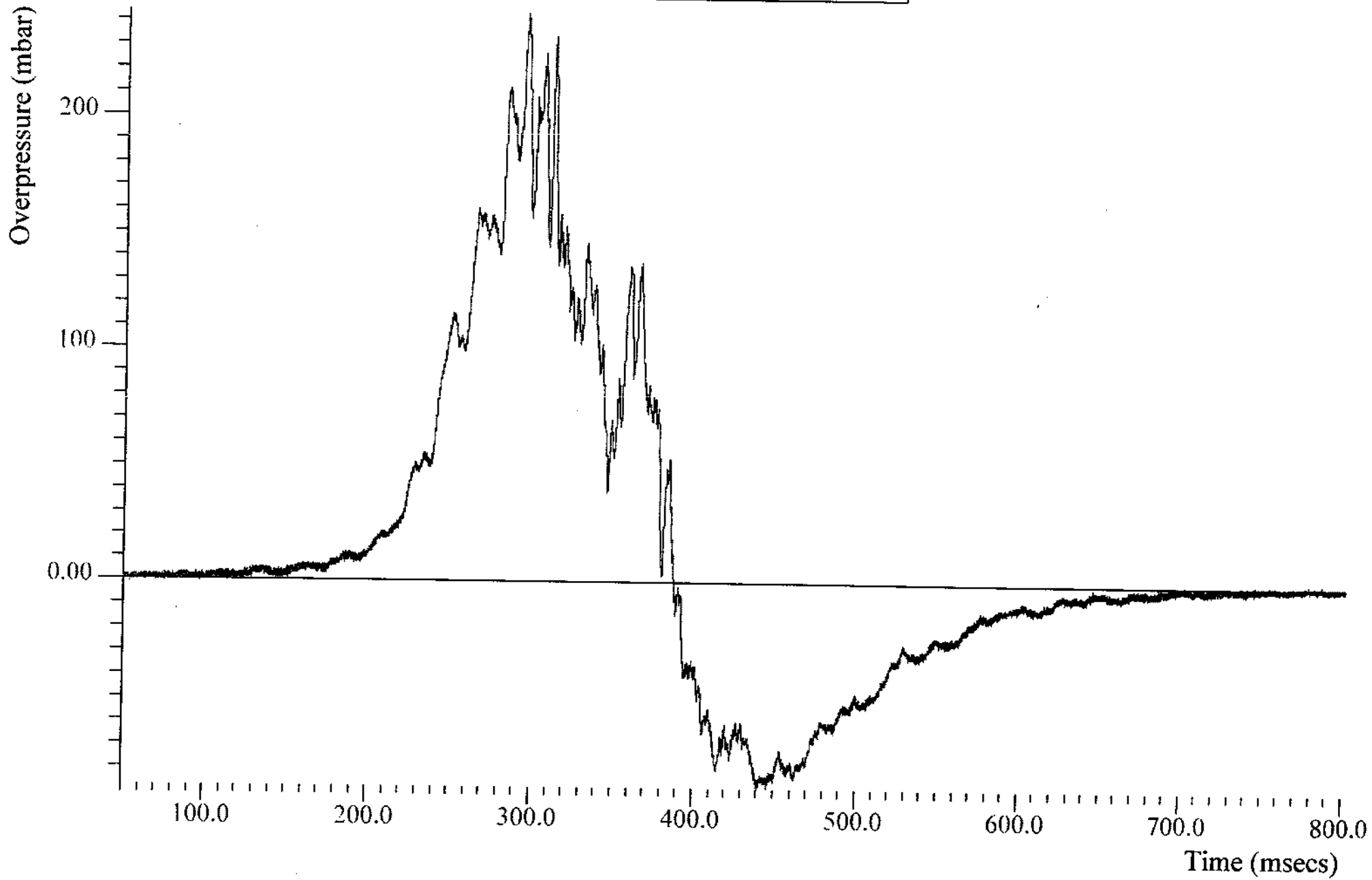
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PI-1



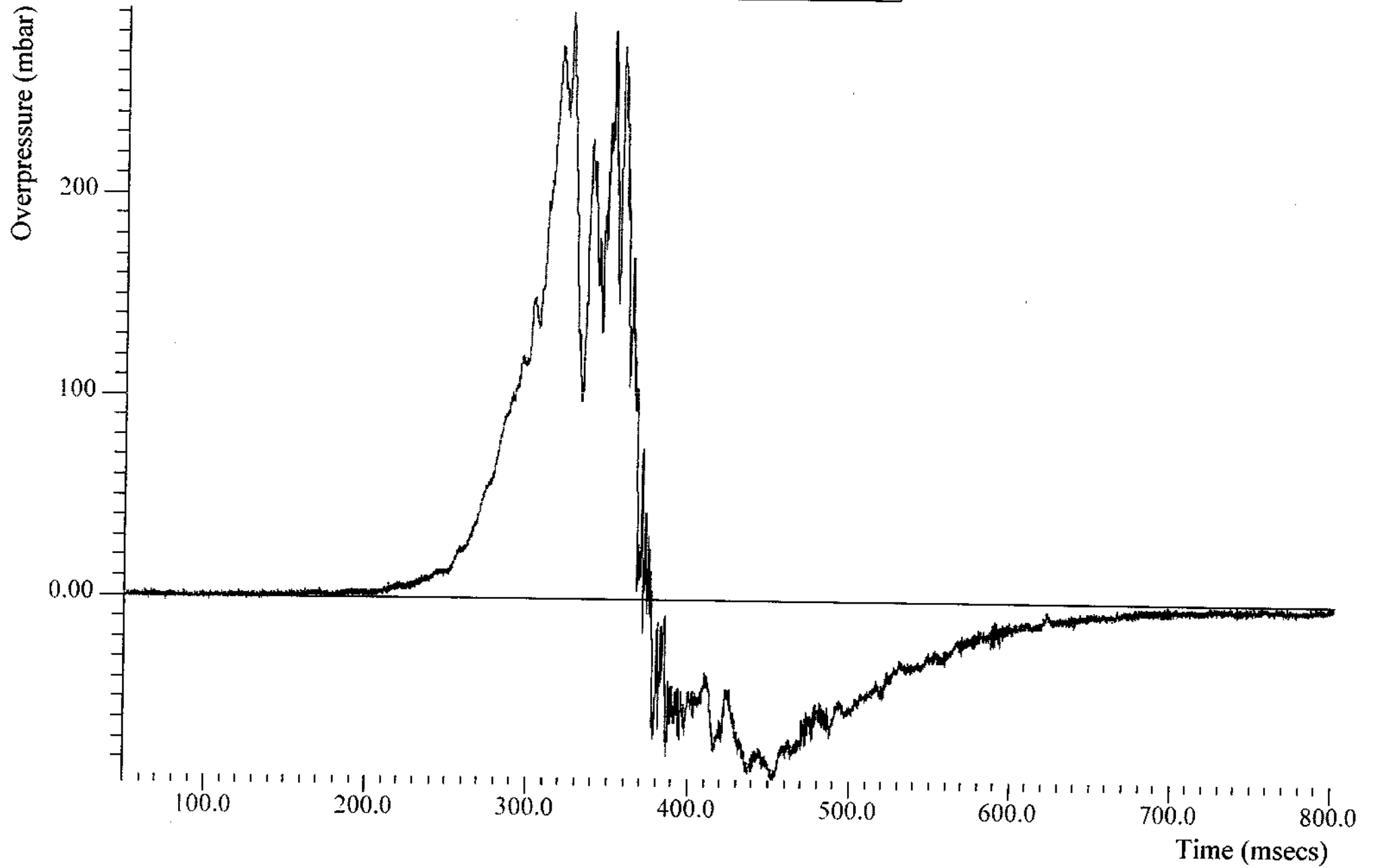
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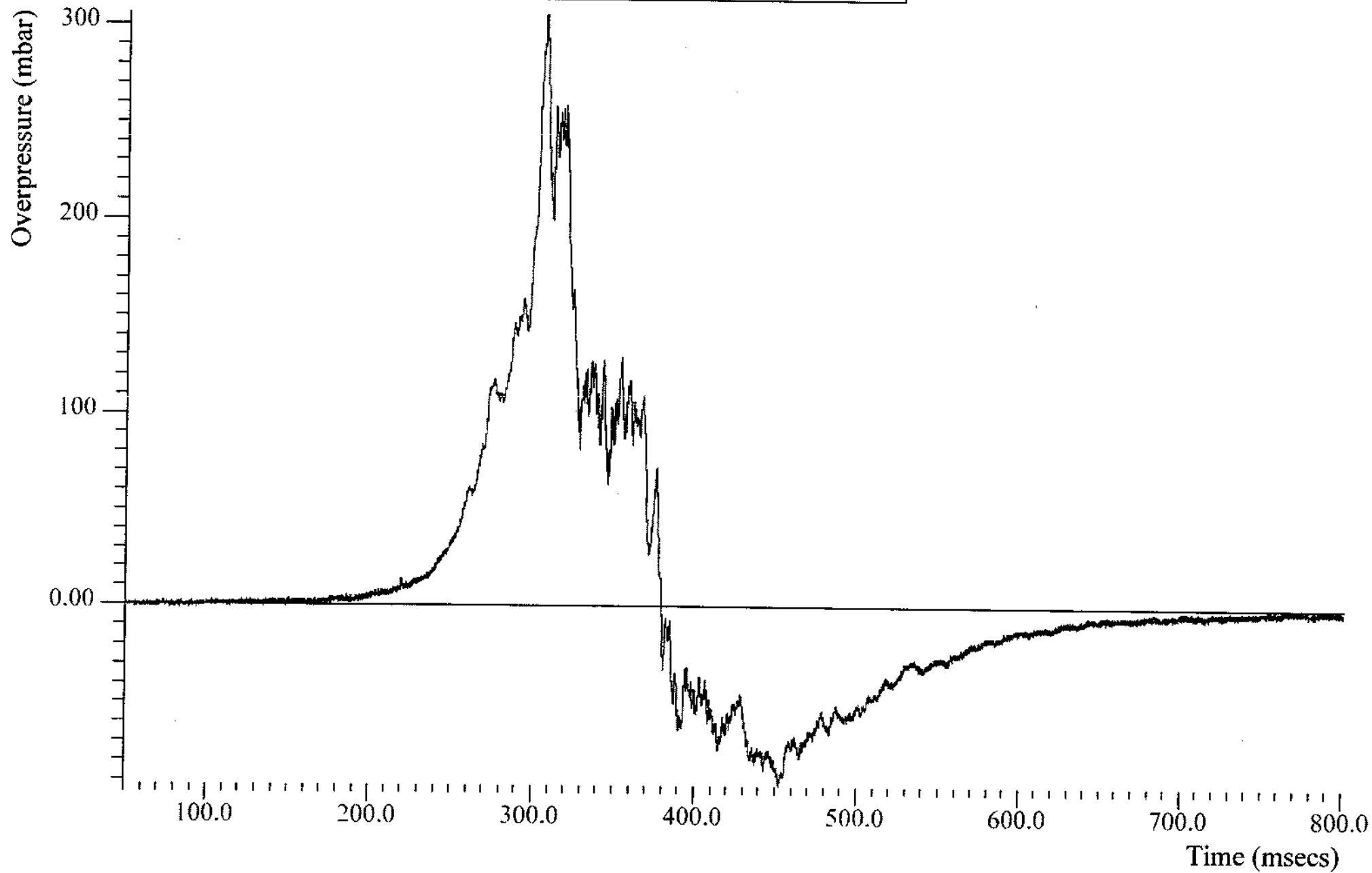
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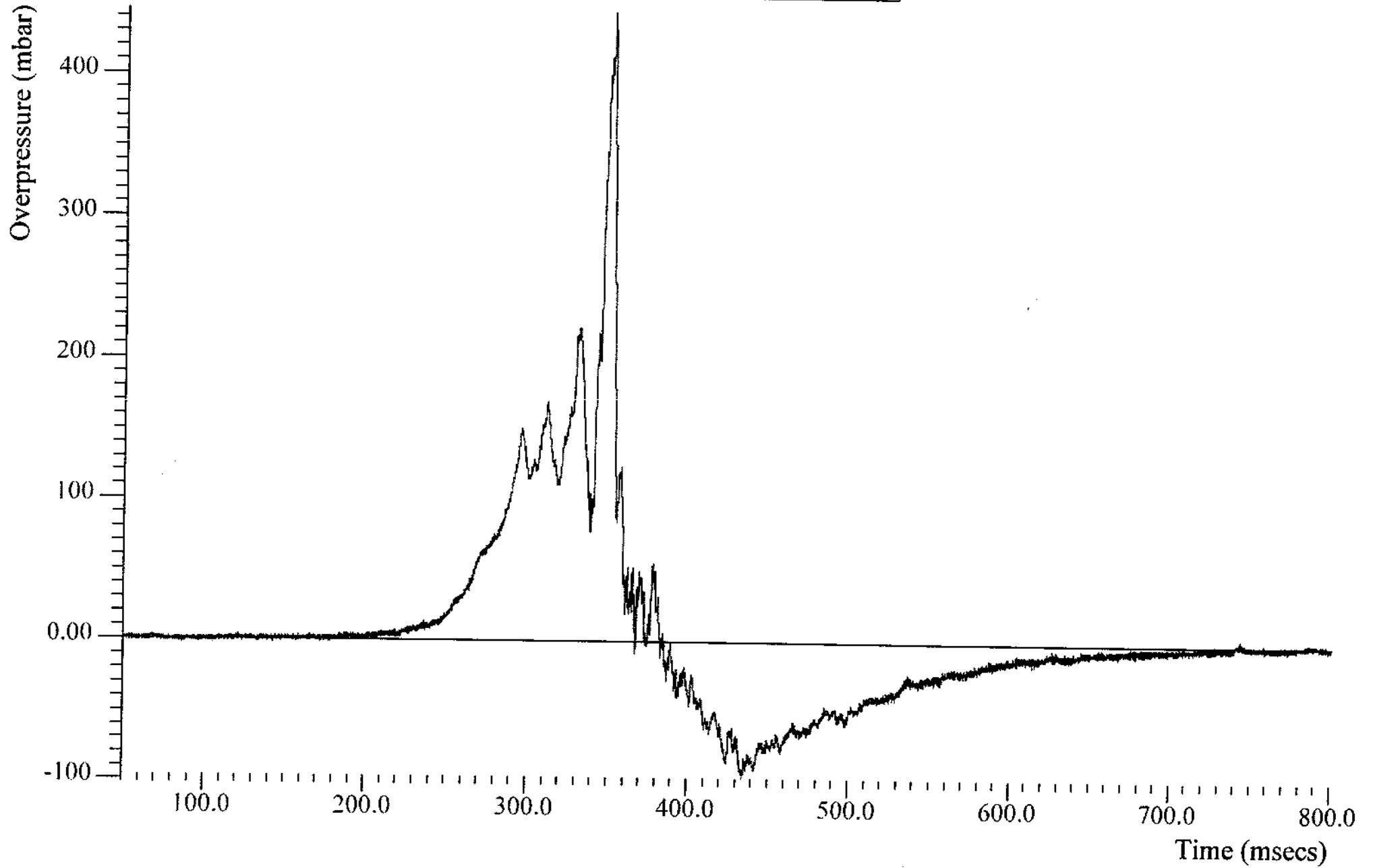
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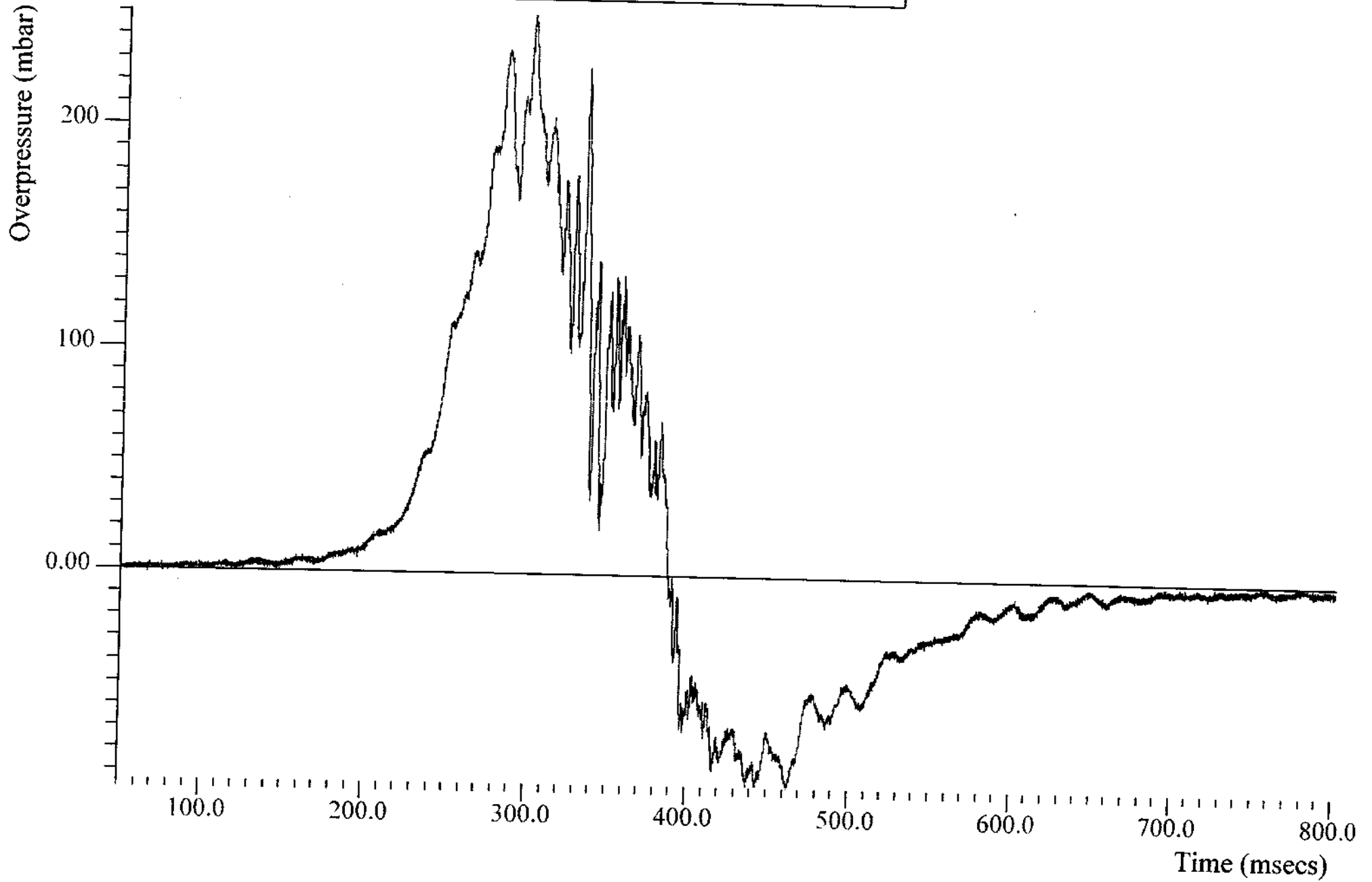
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Transducer no: PI-4



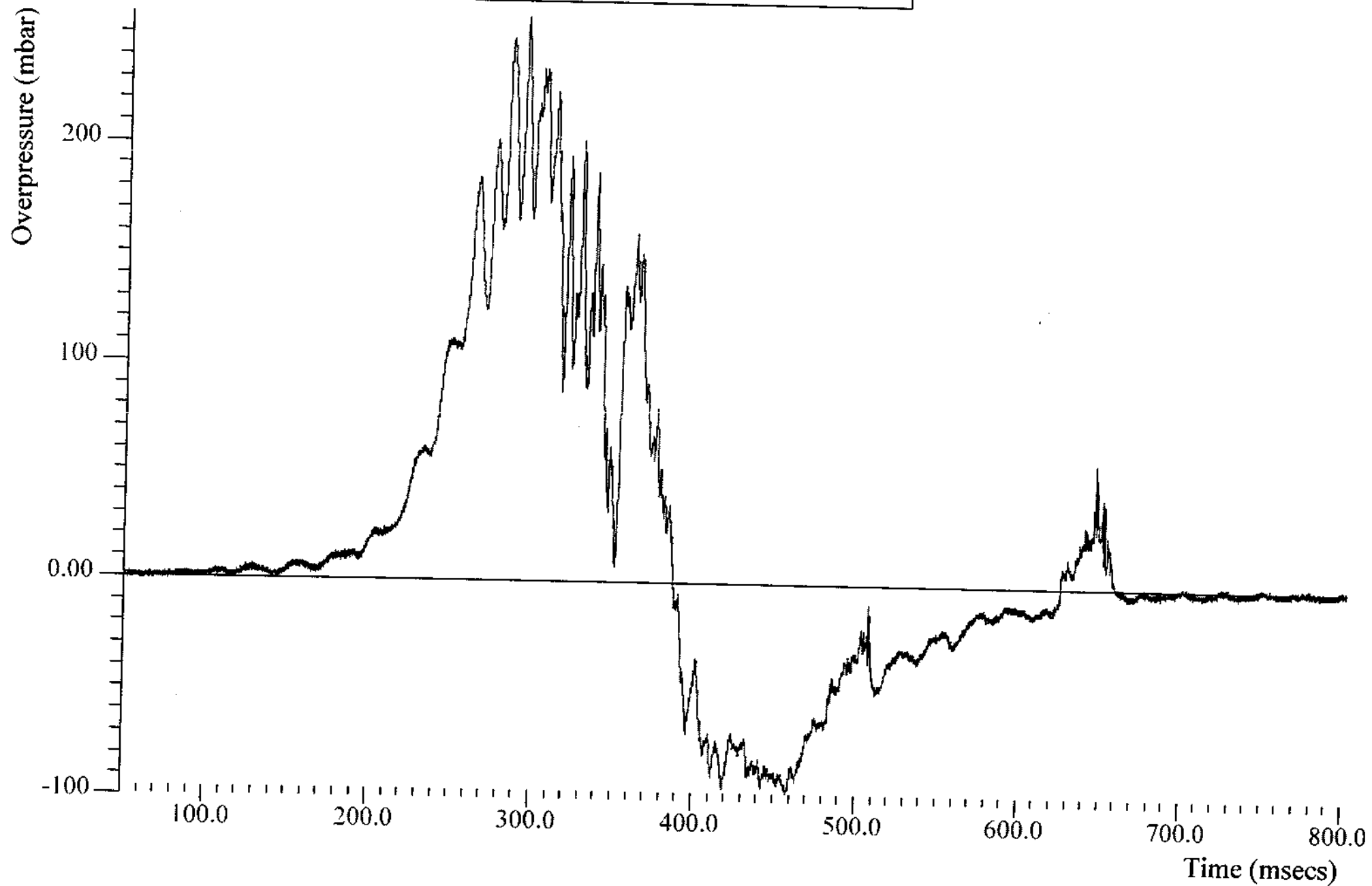
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Transducer no: PI-6



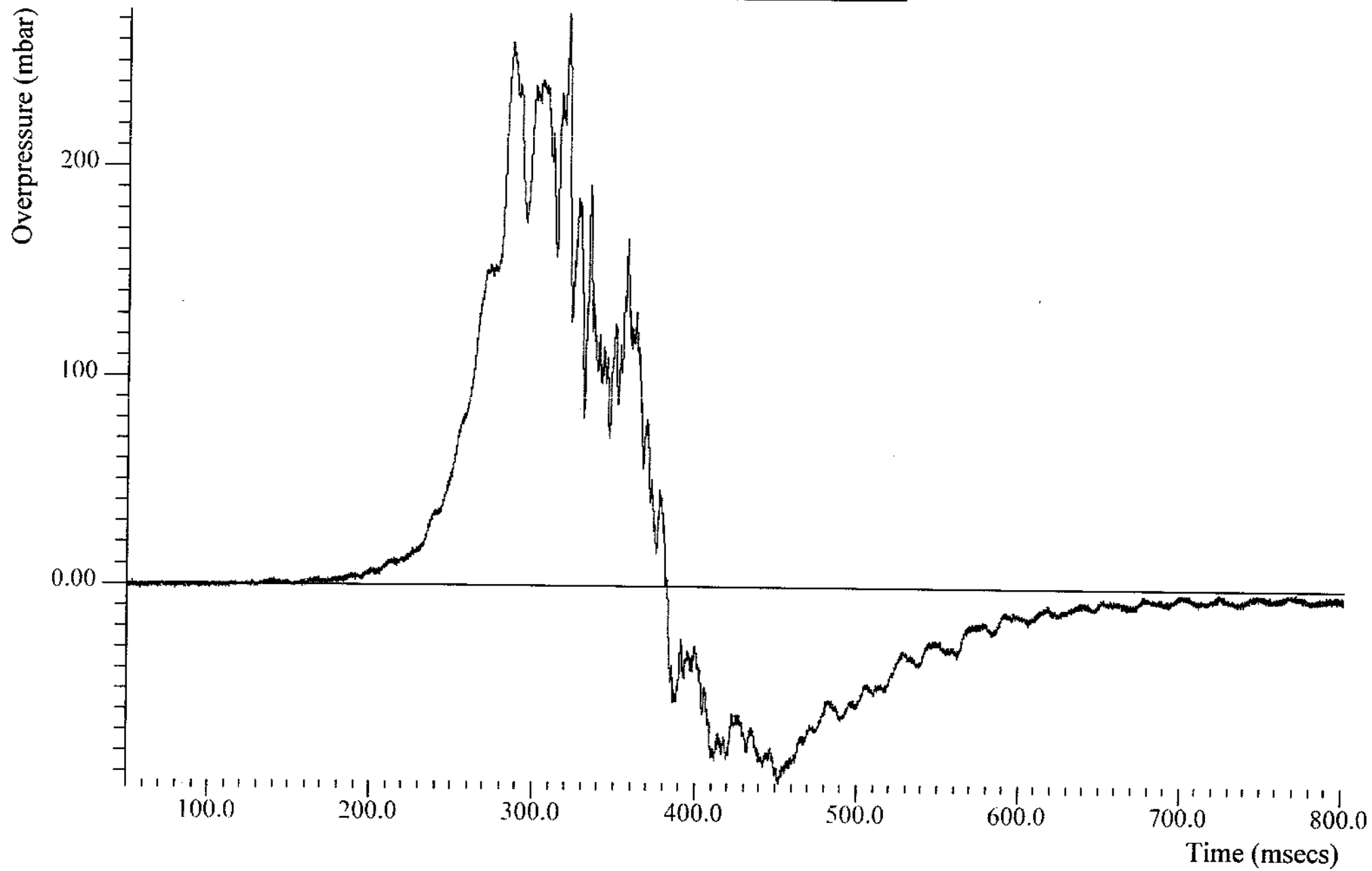
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PI-7



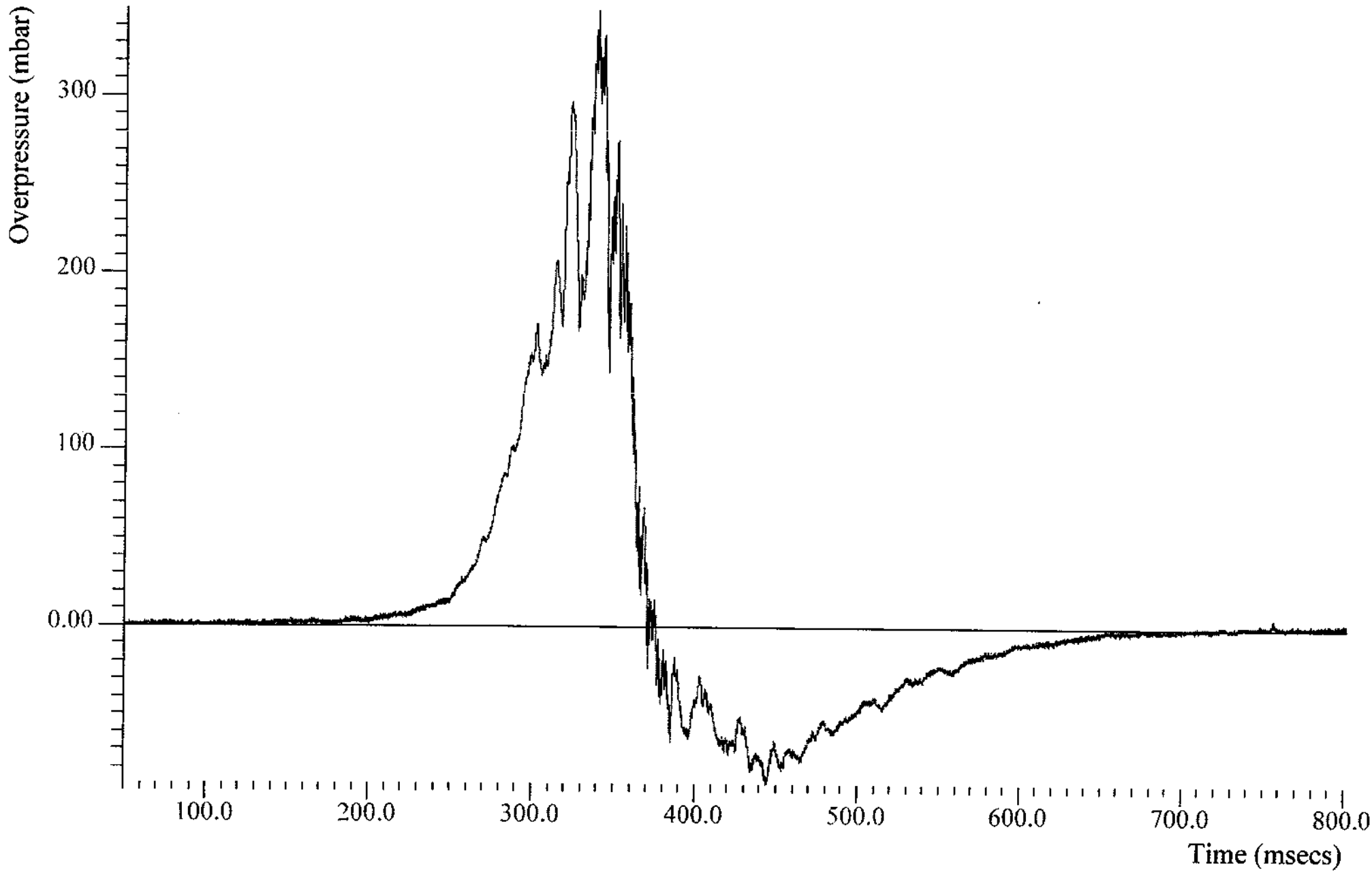
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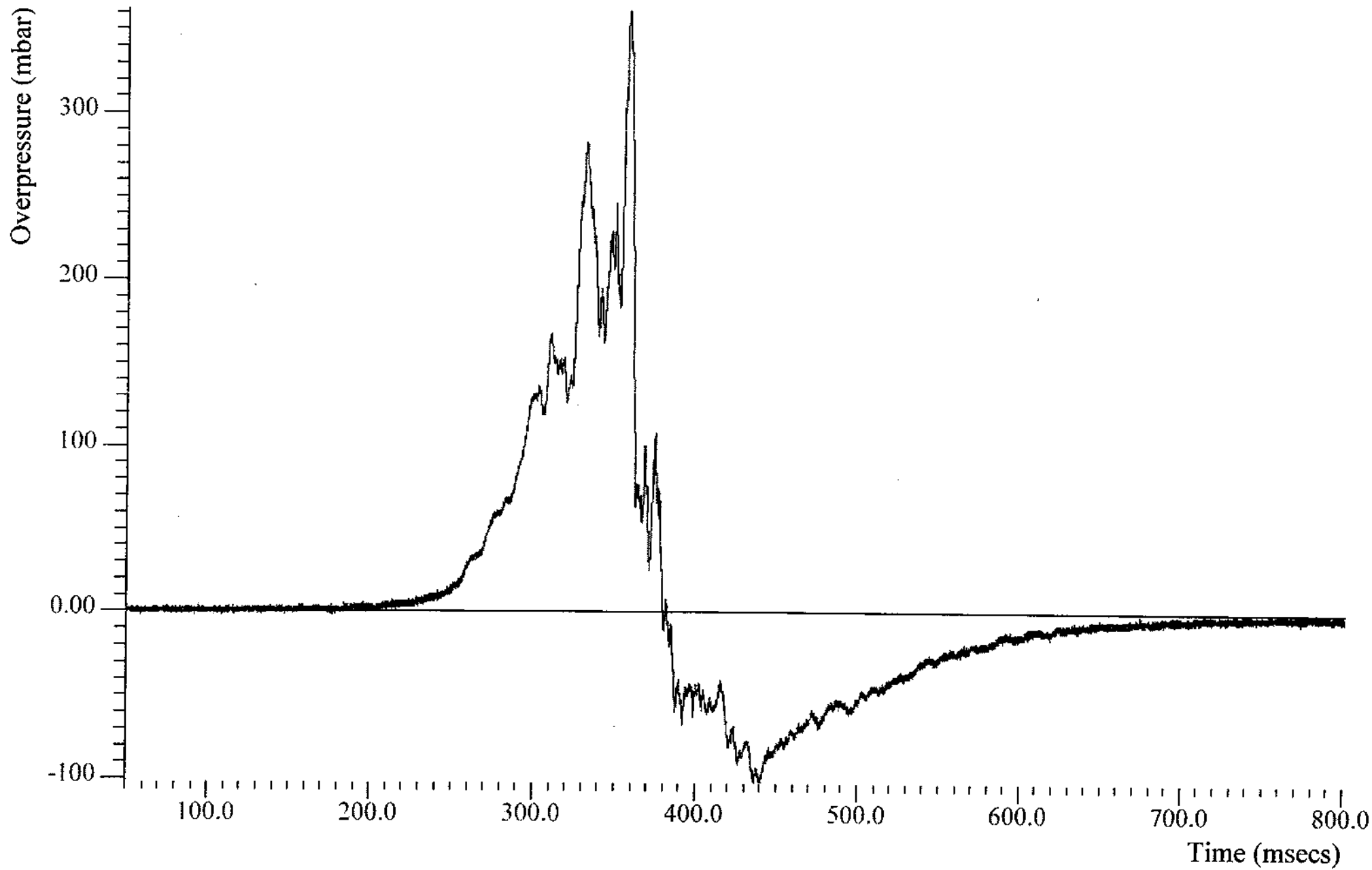
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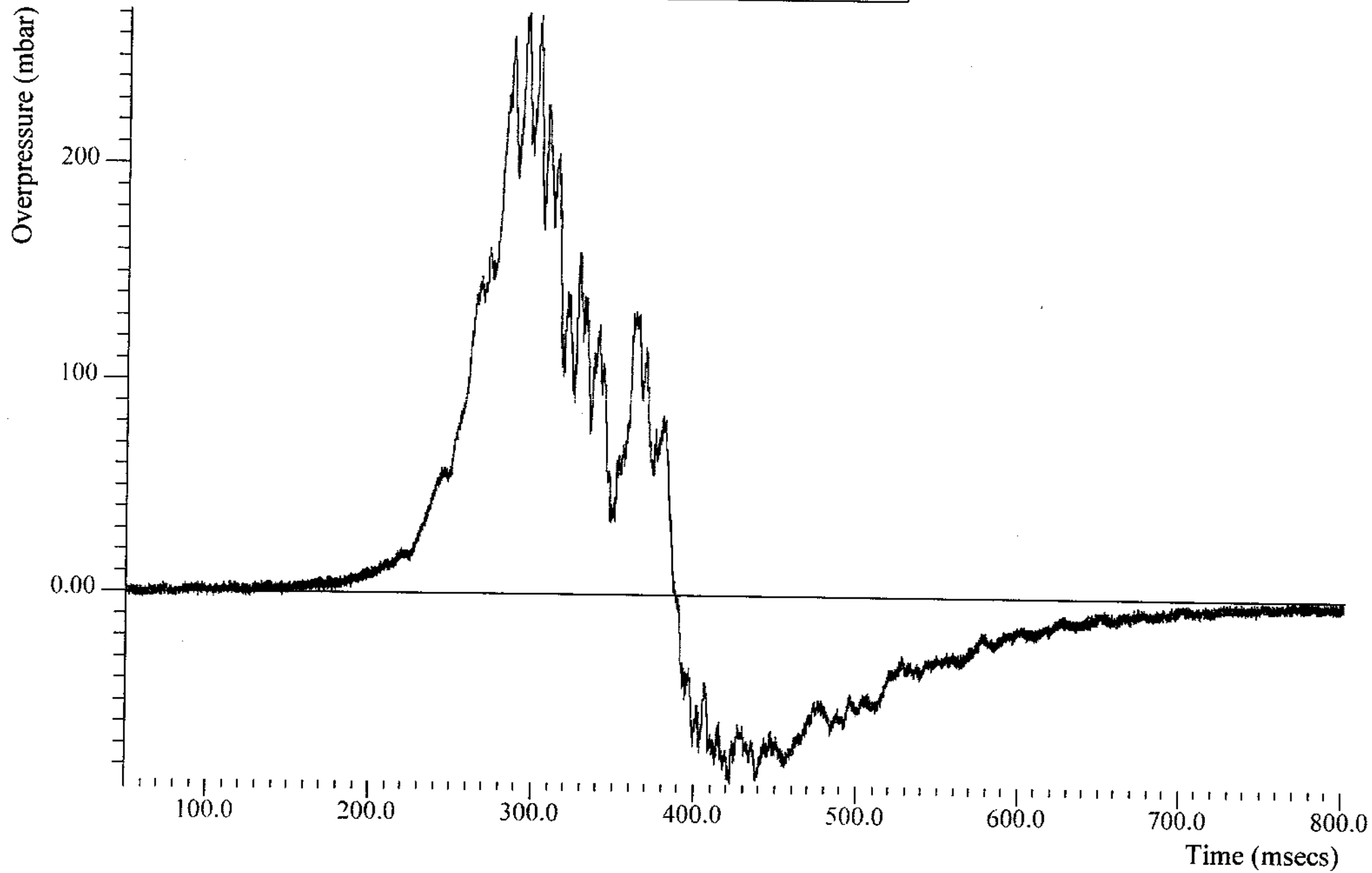
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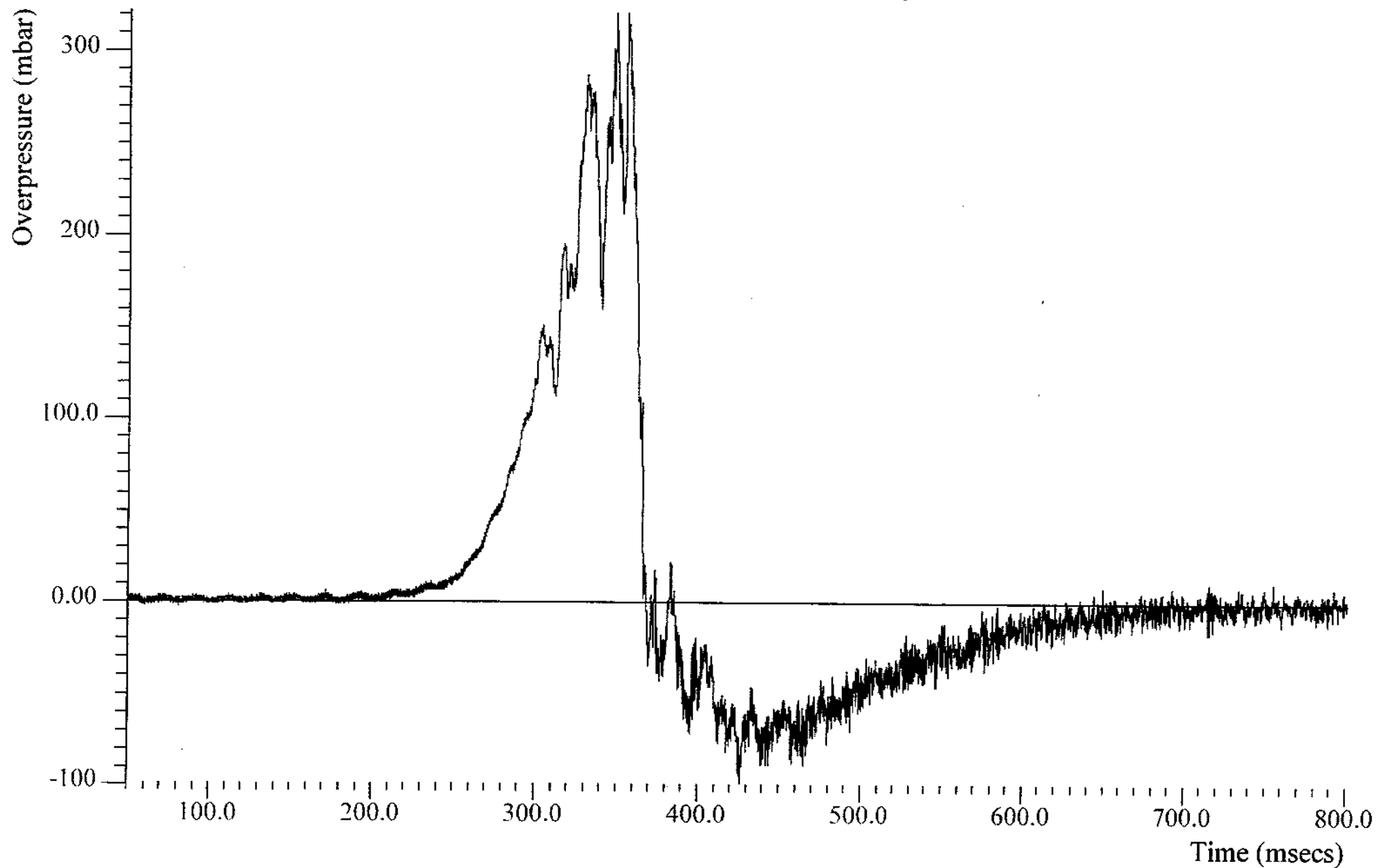
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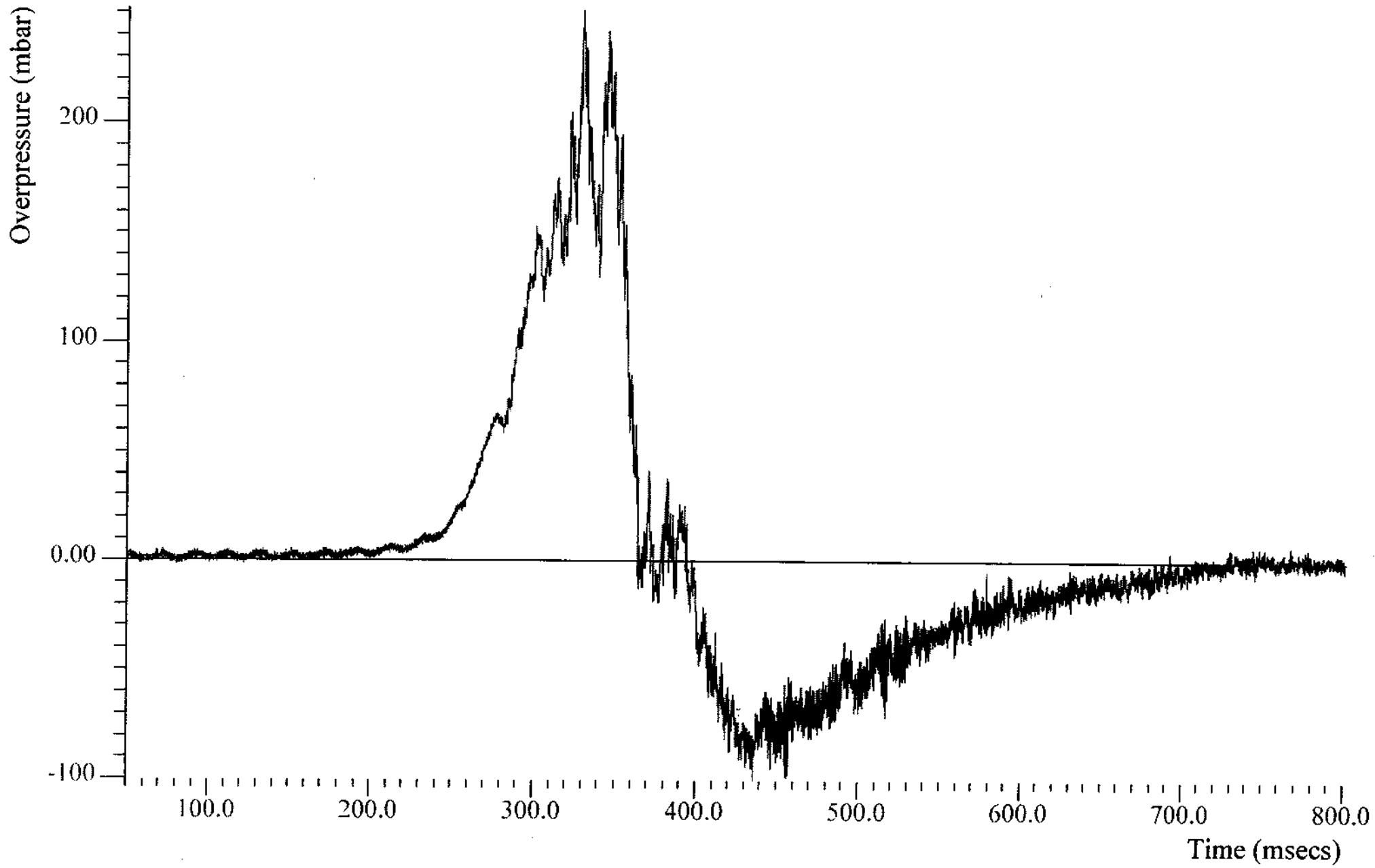
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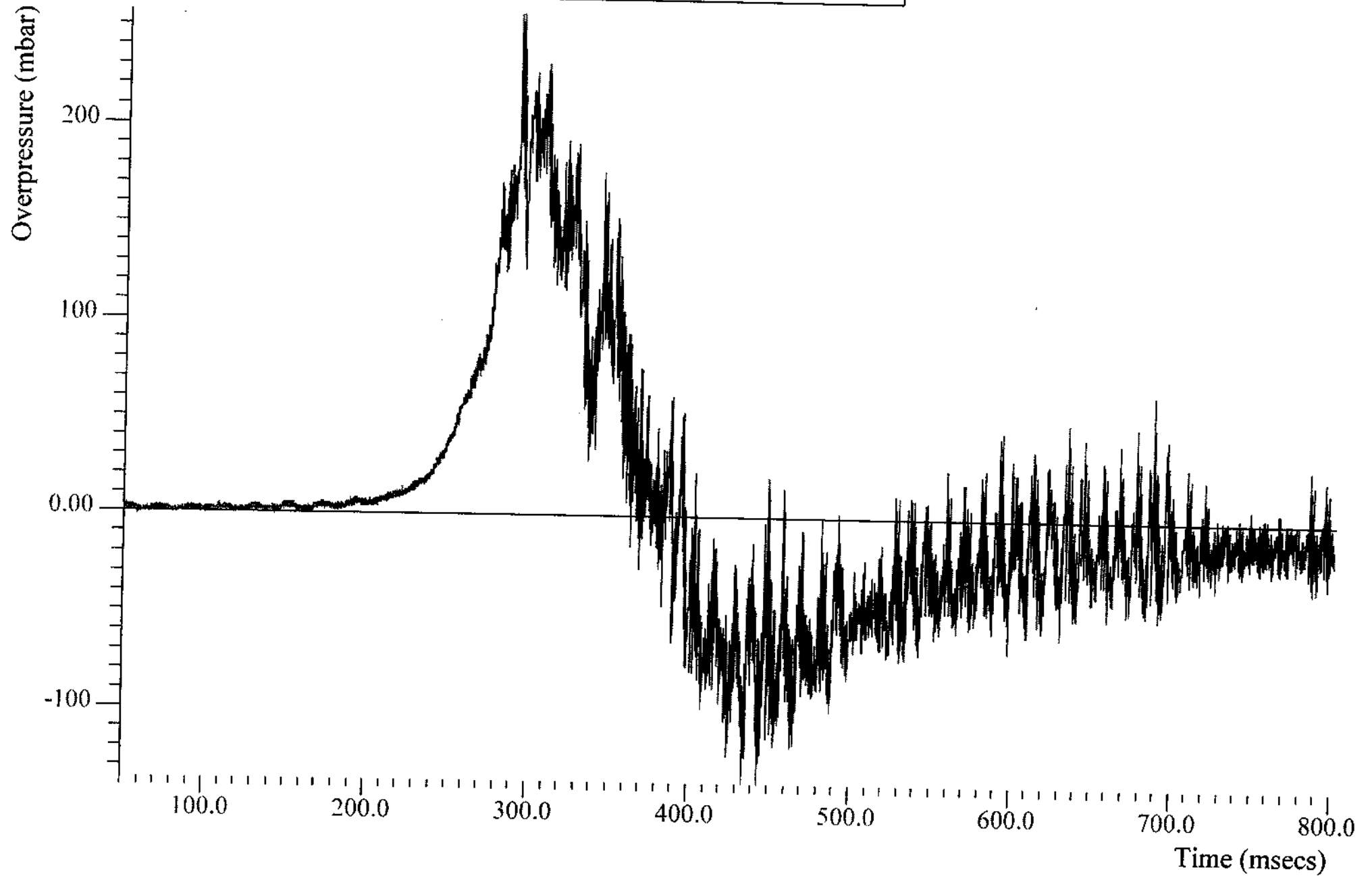
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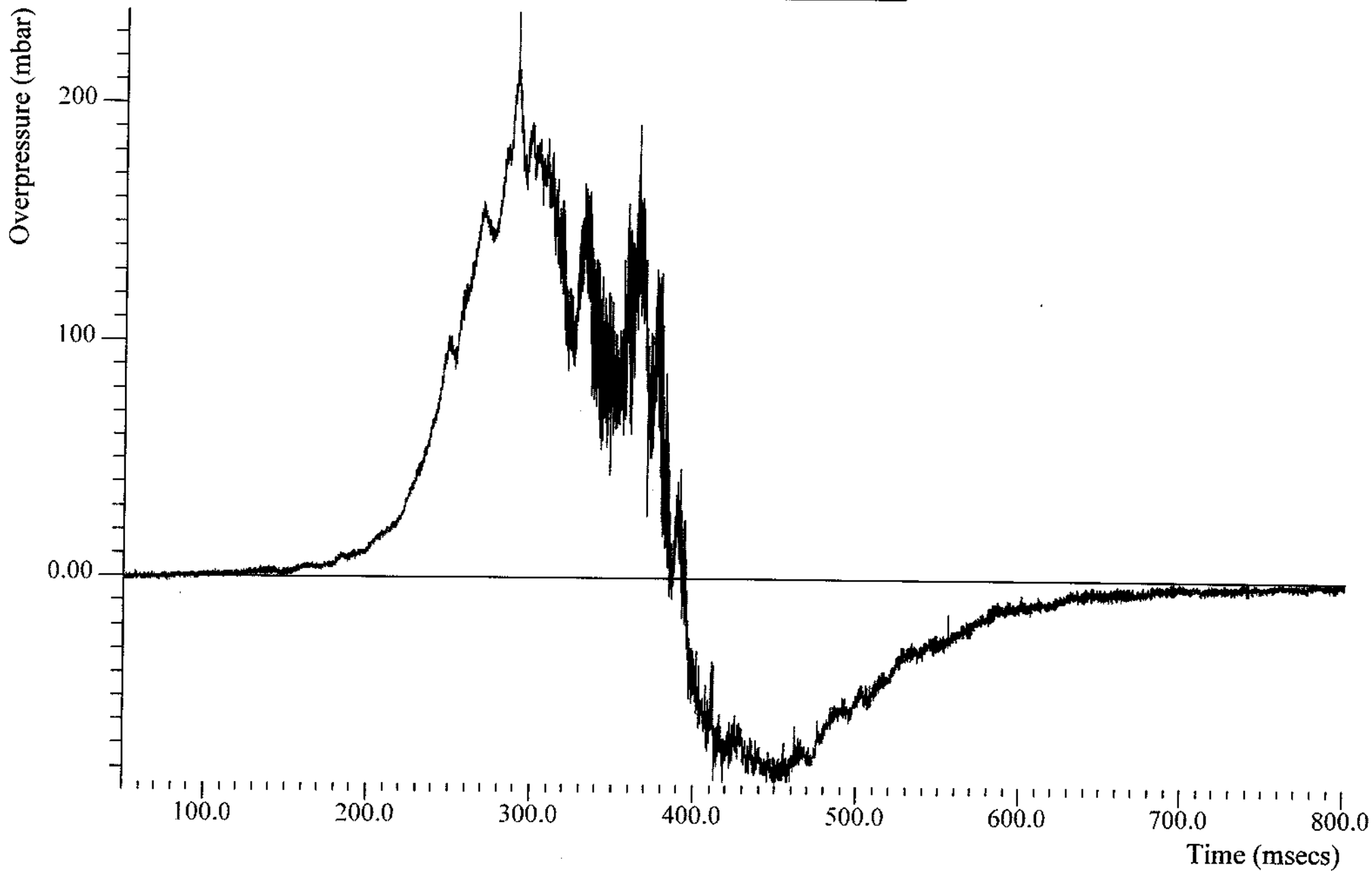
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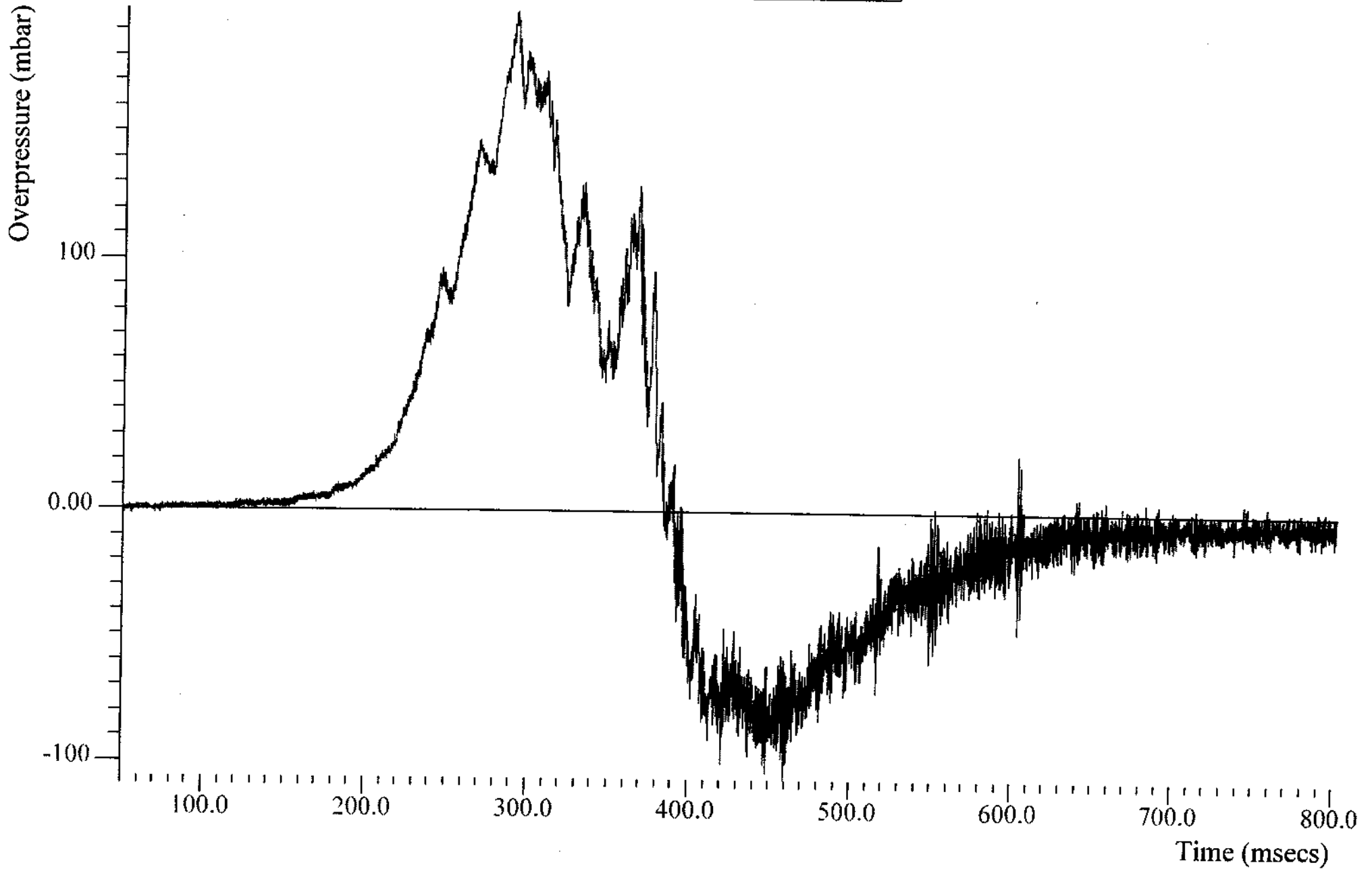
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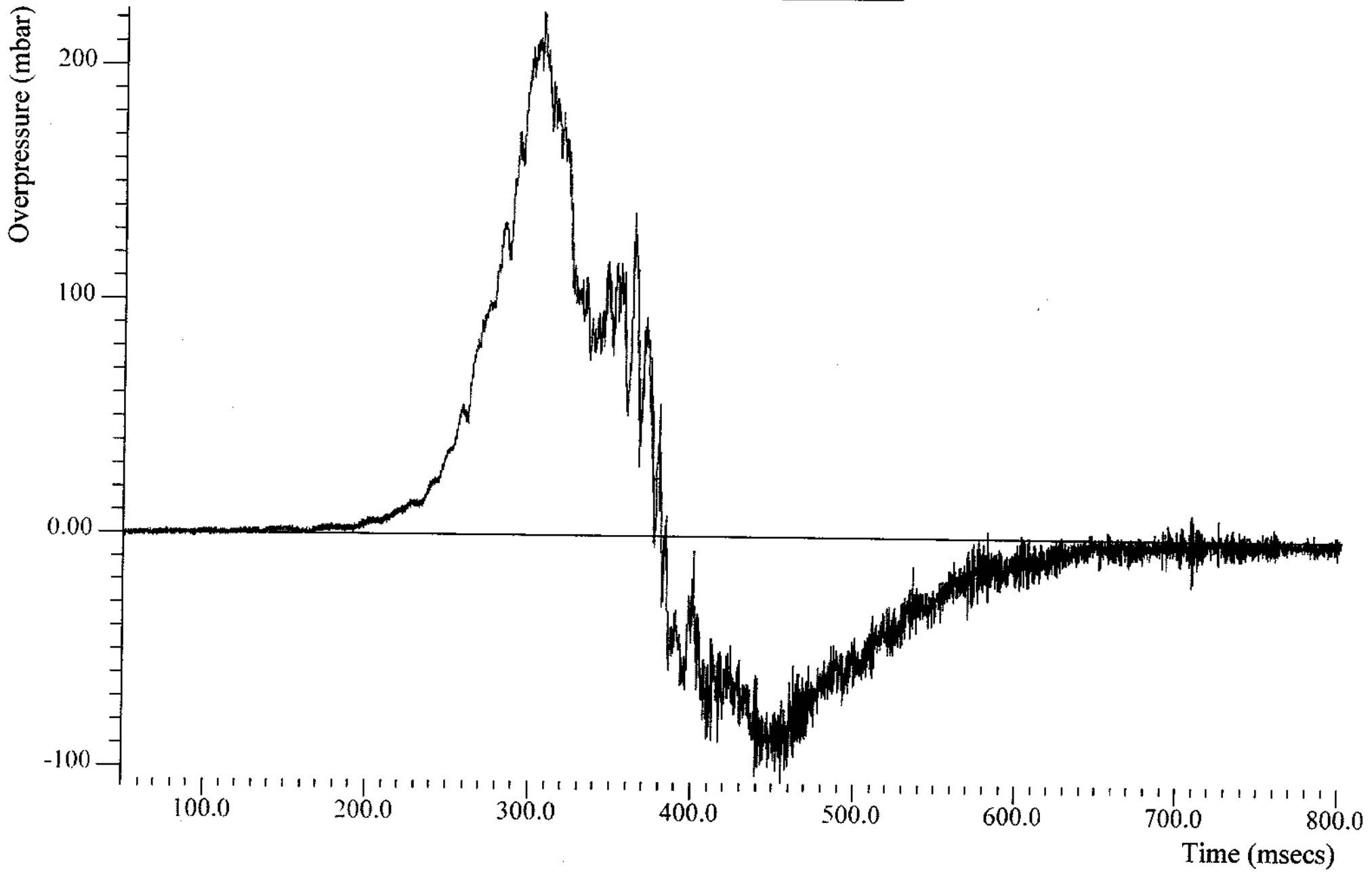
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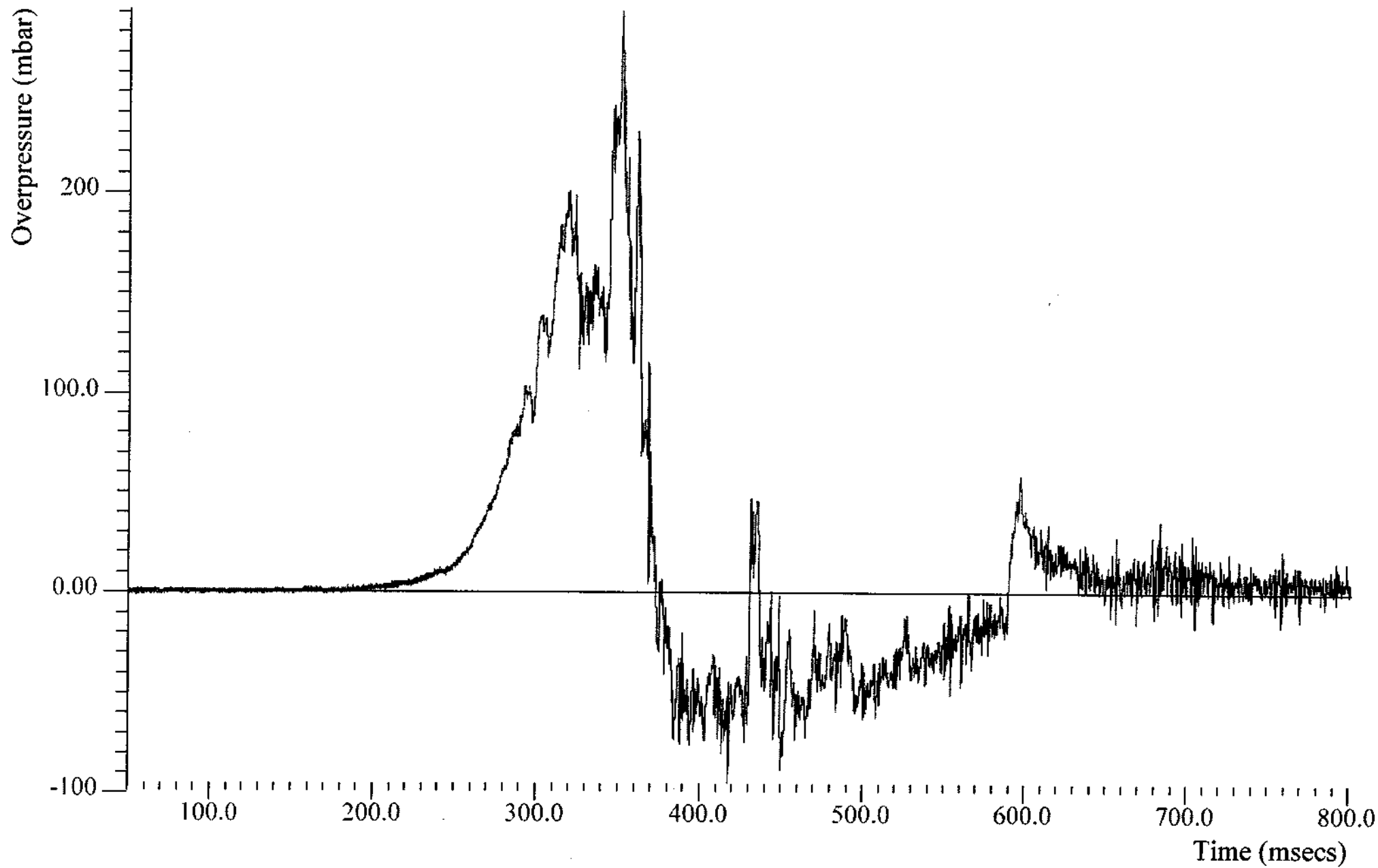
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Transducer no: PI-17



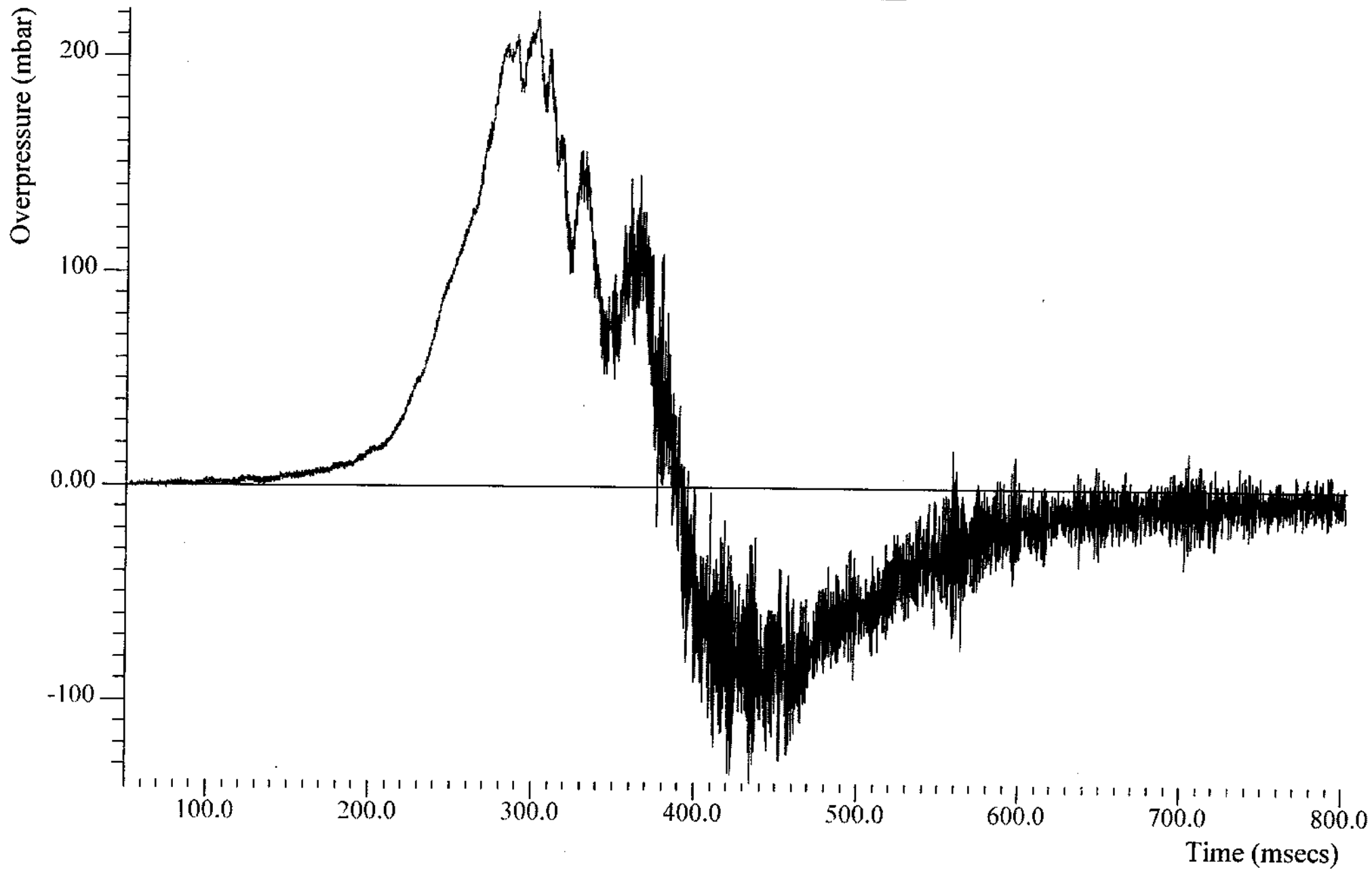
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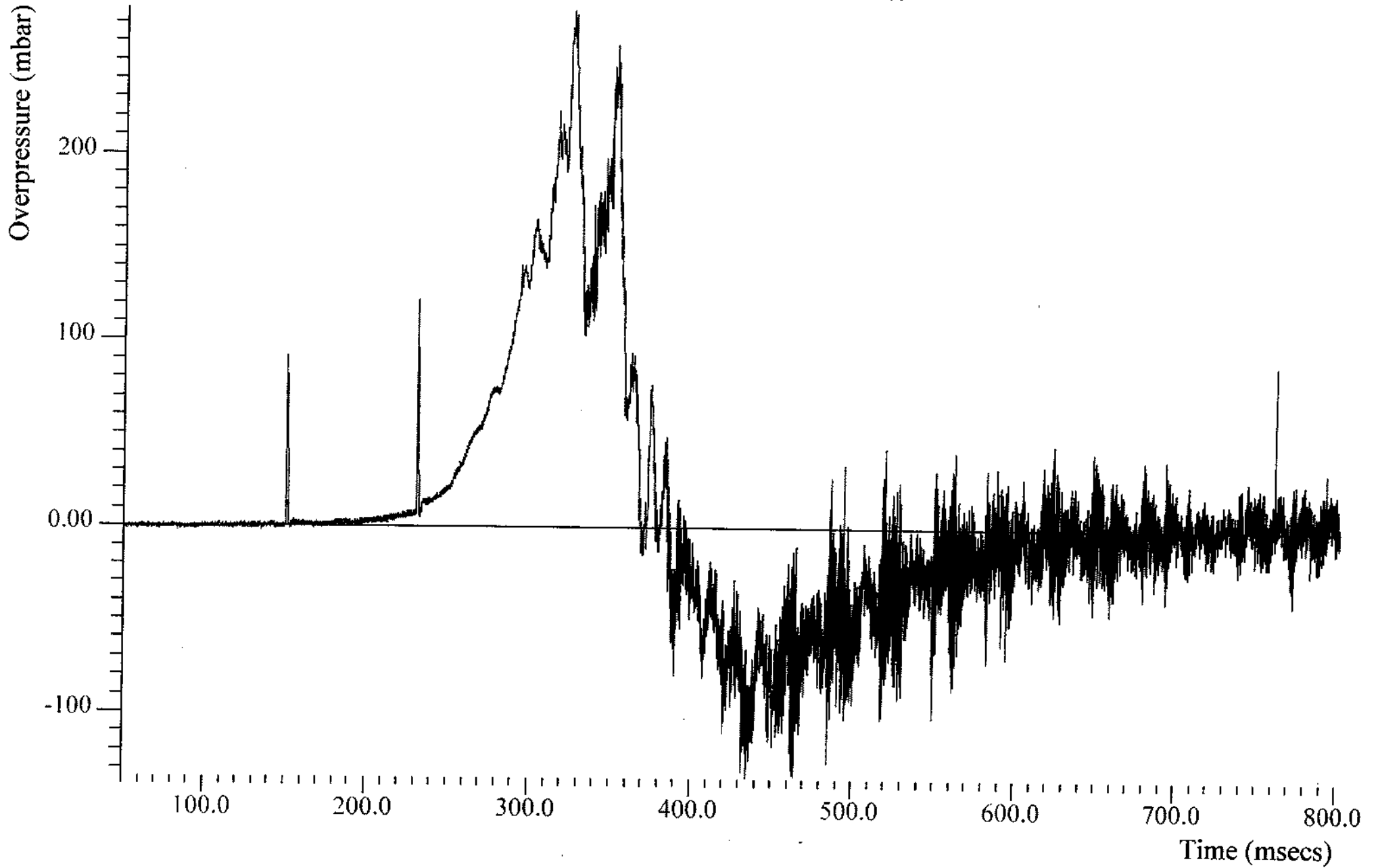
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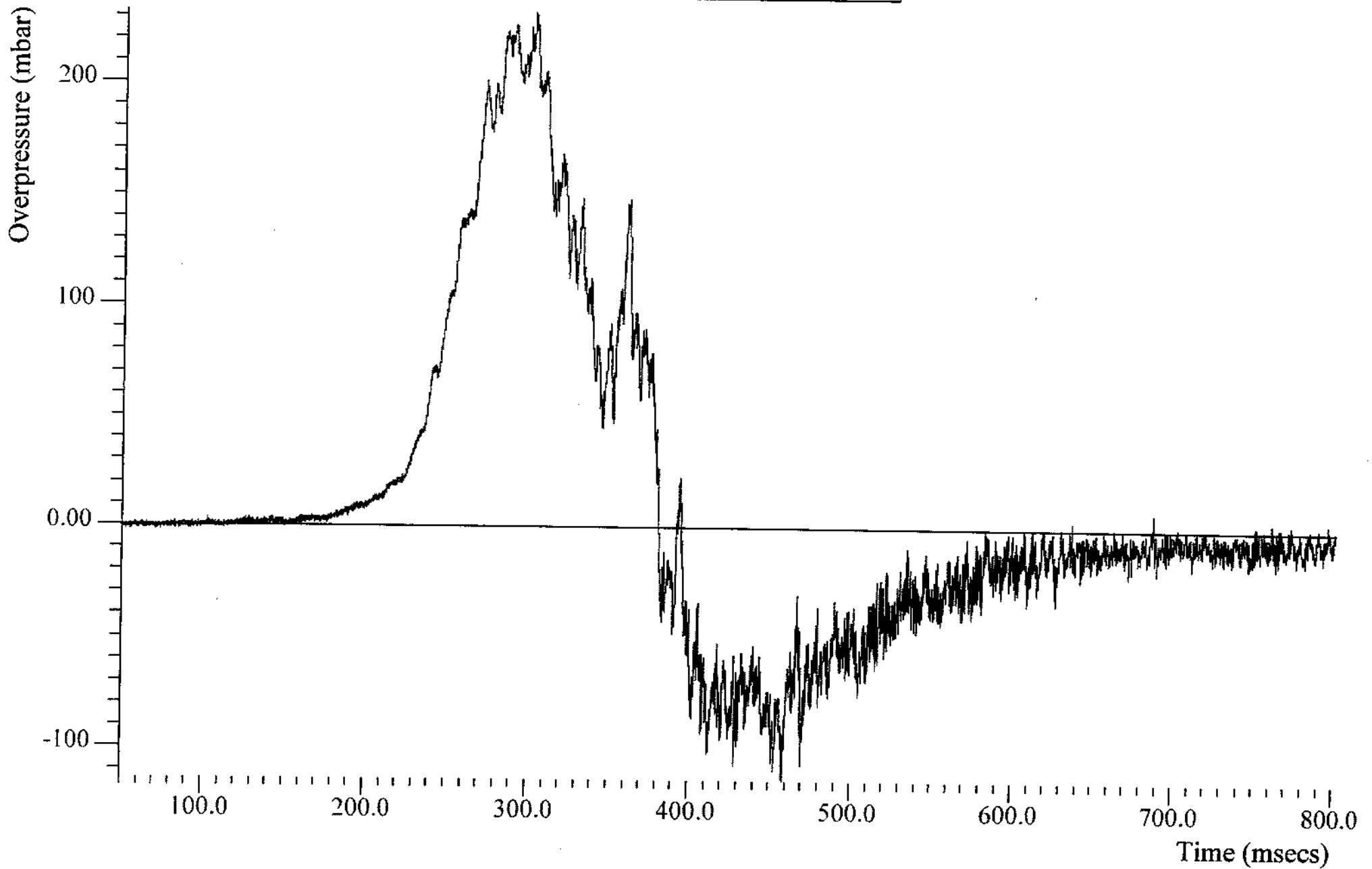
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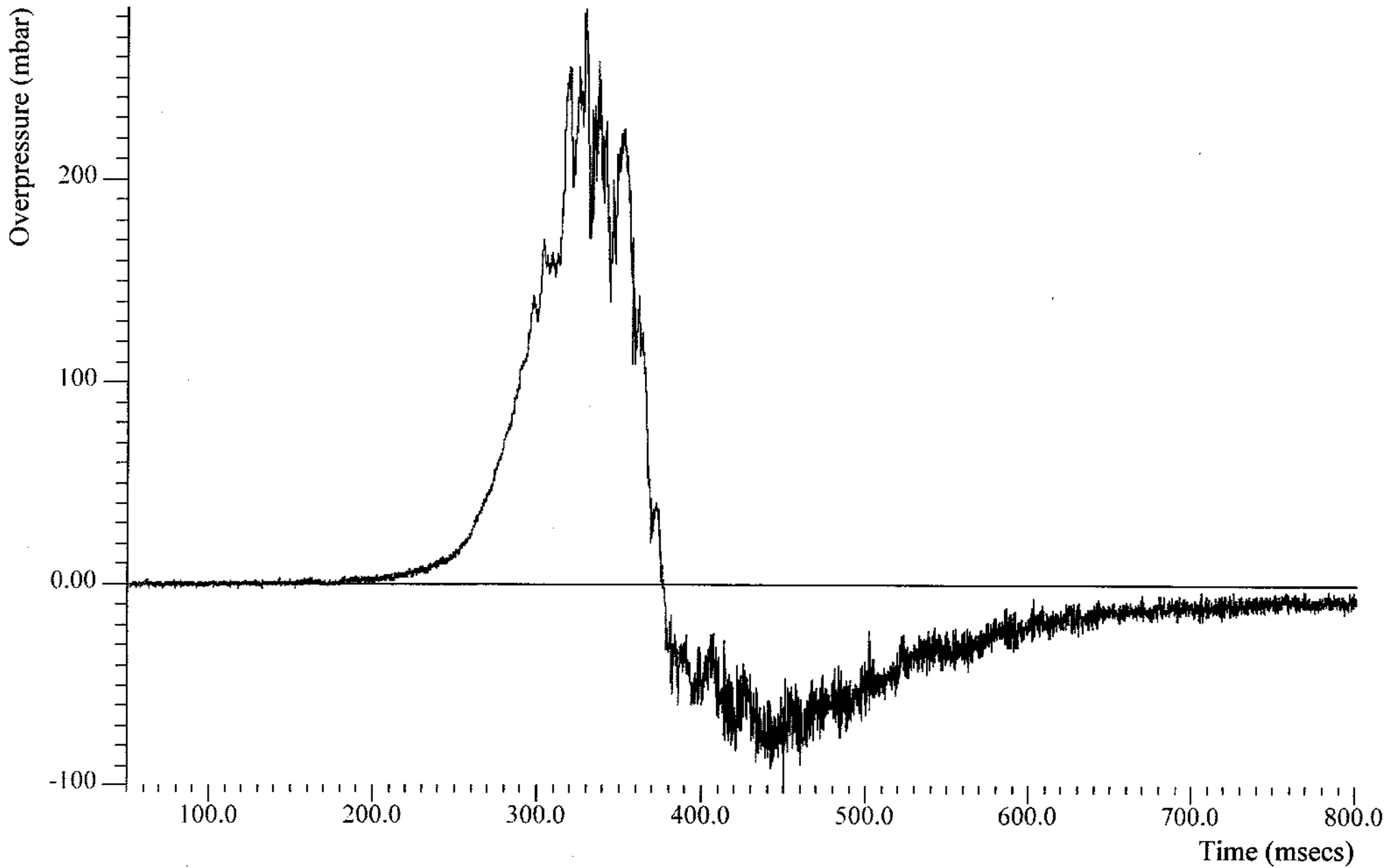
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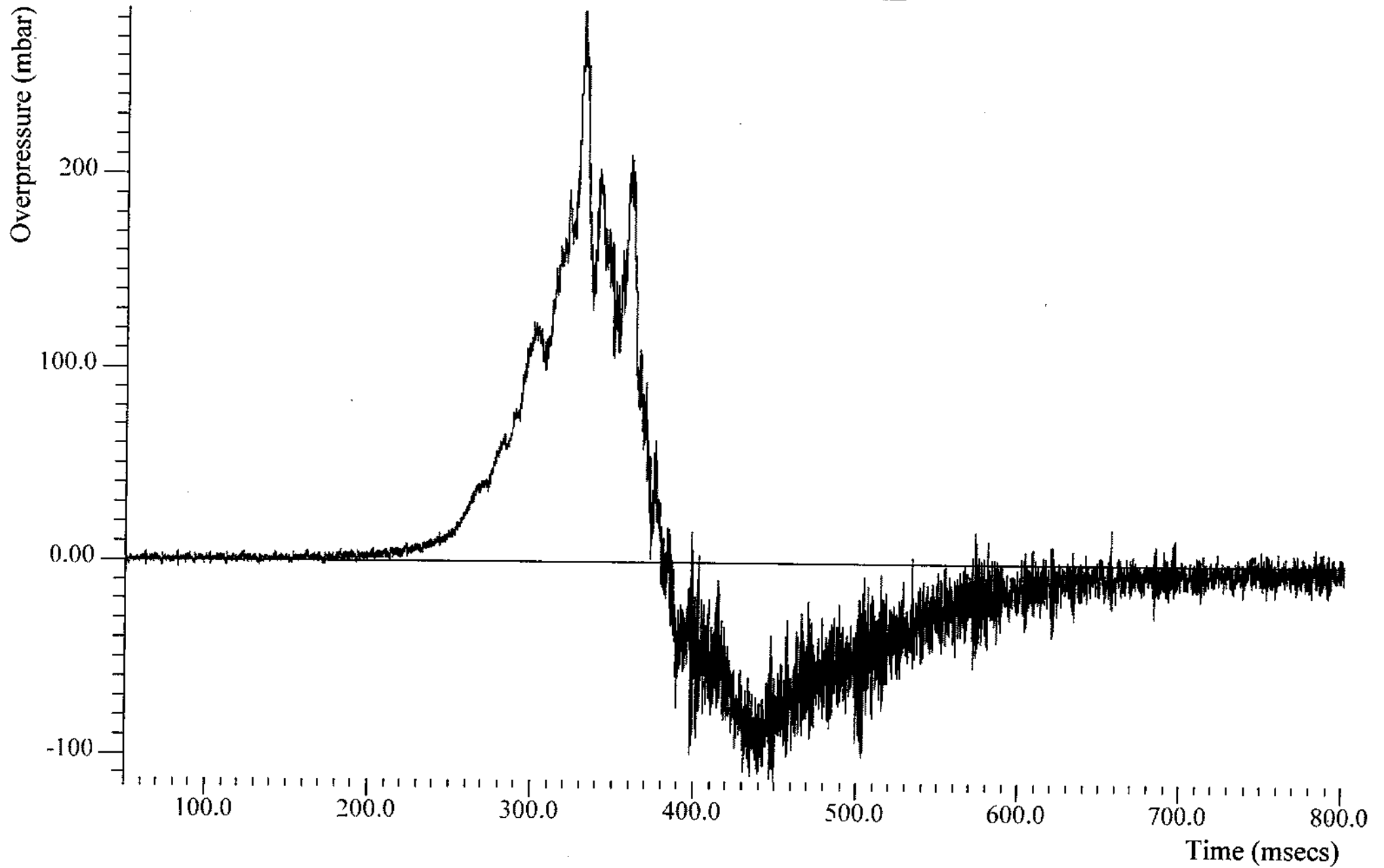
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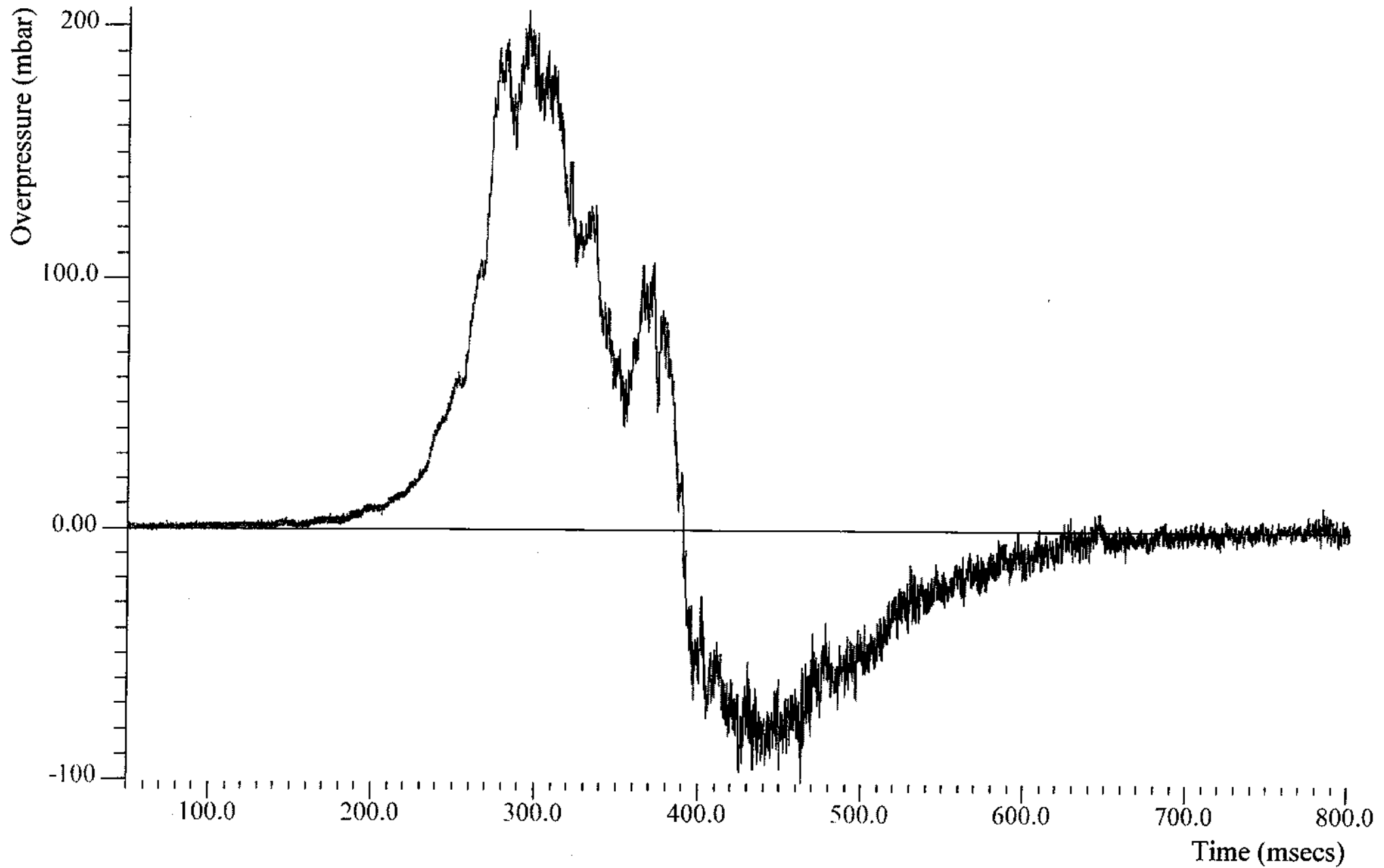
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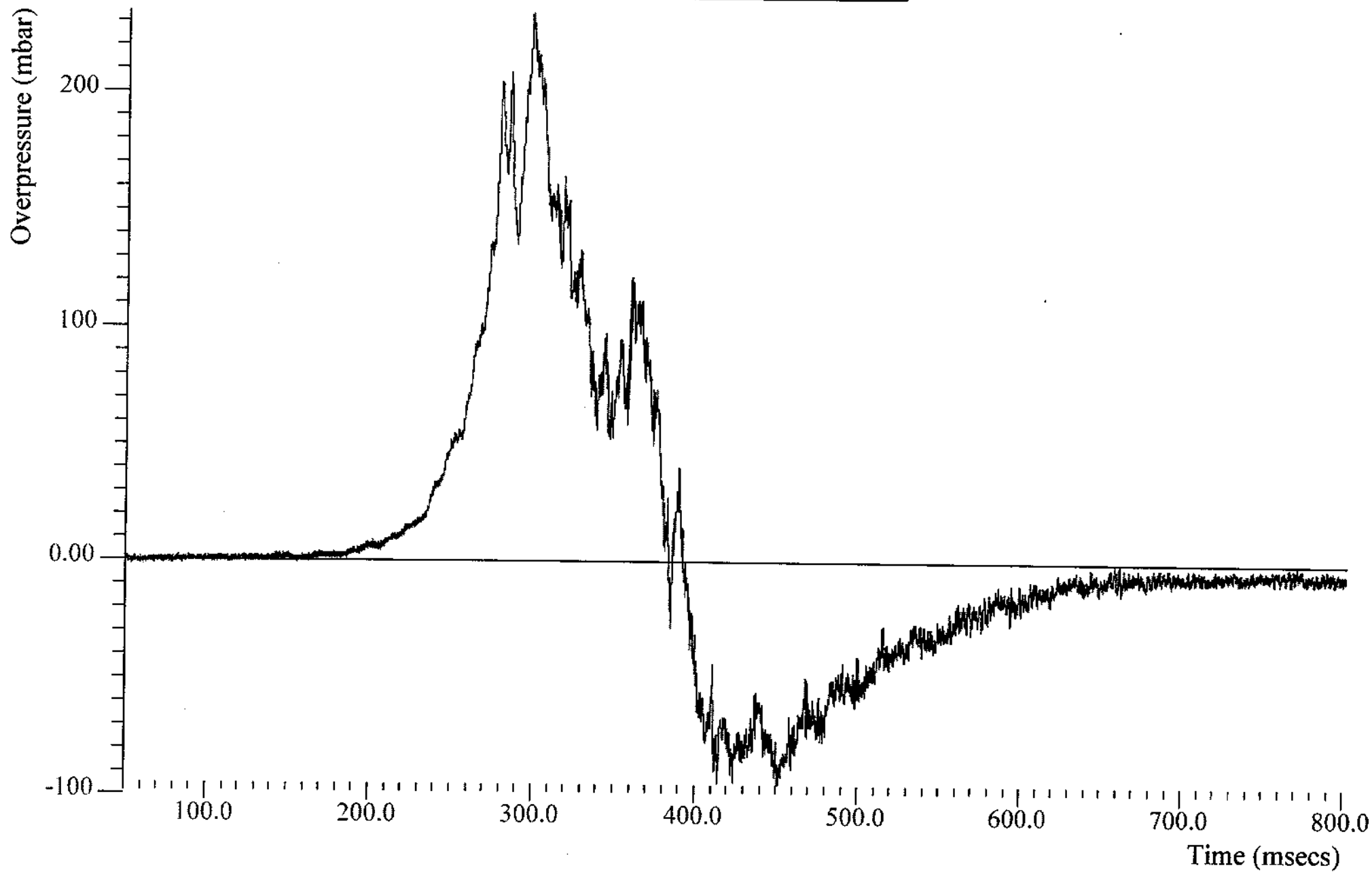
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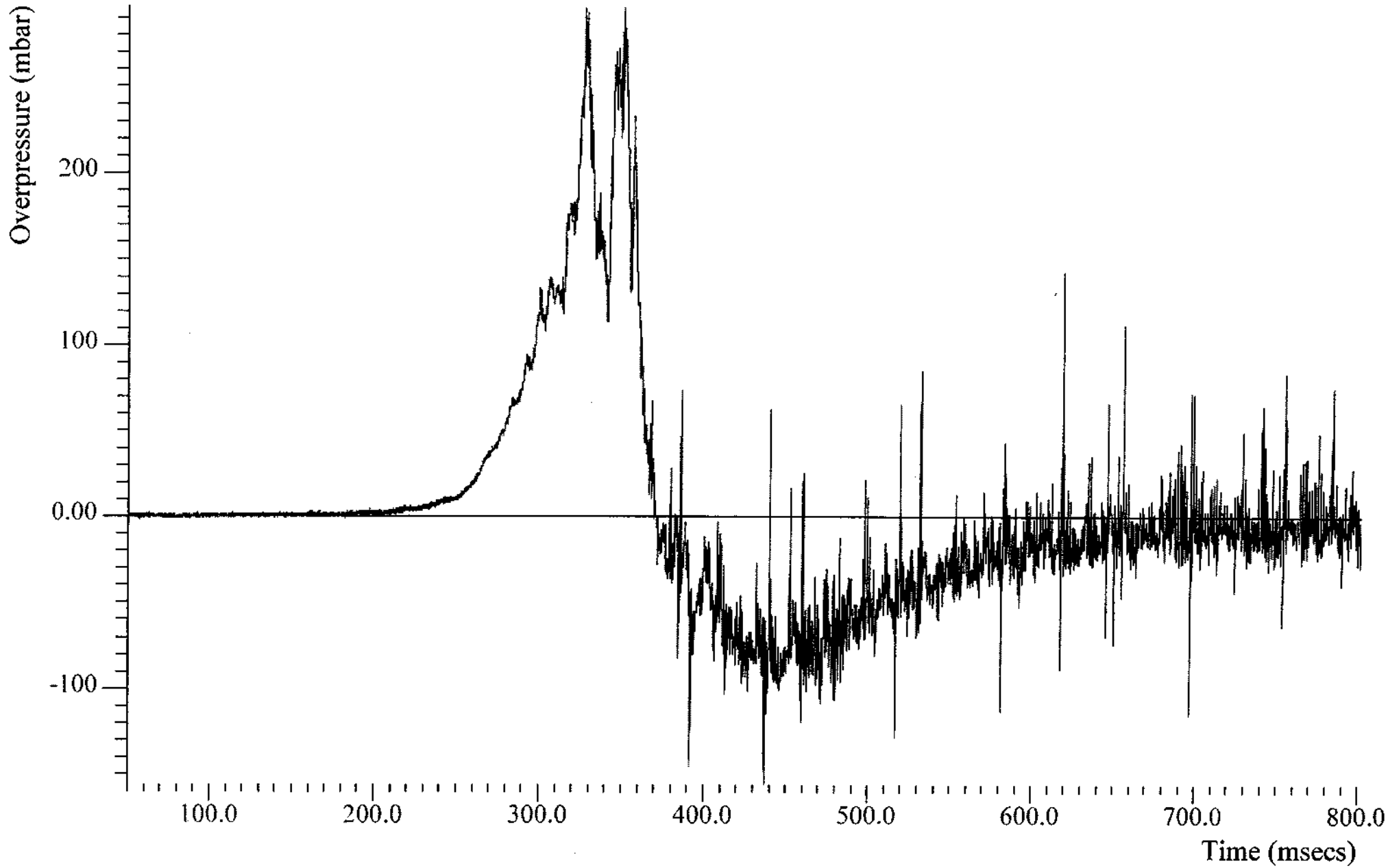
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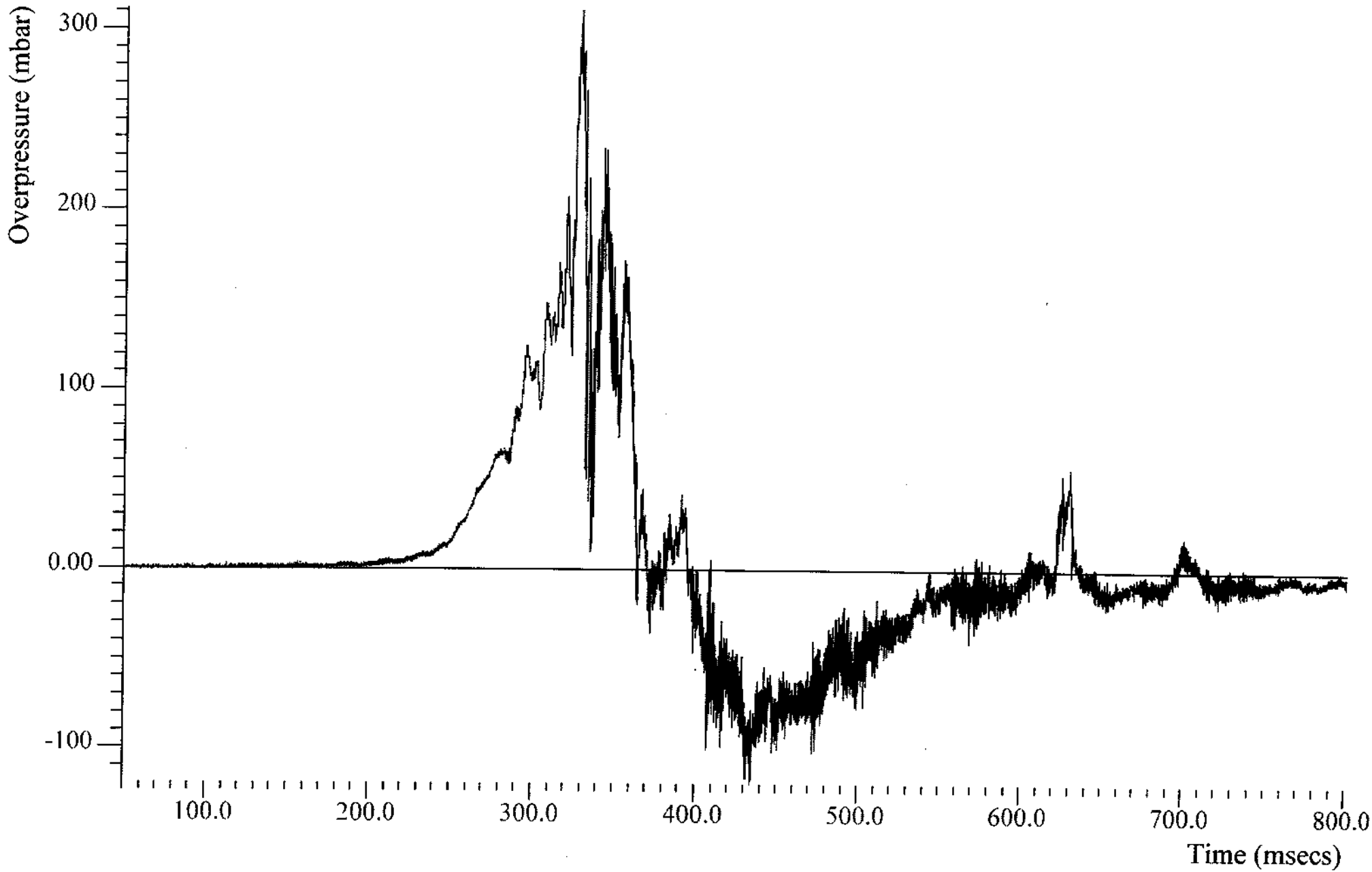
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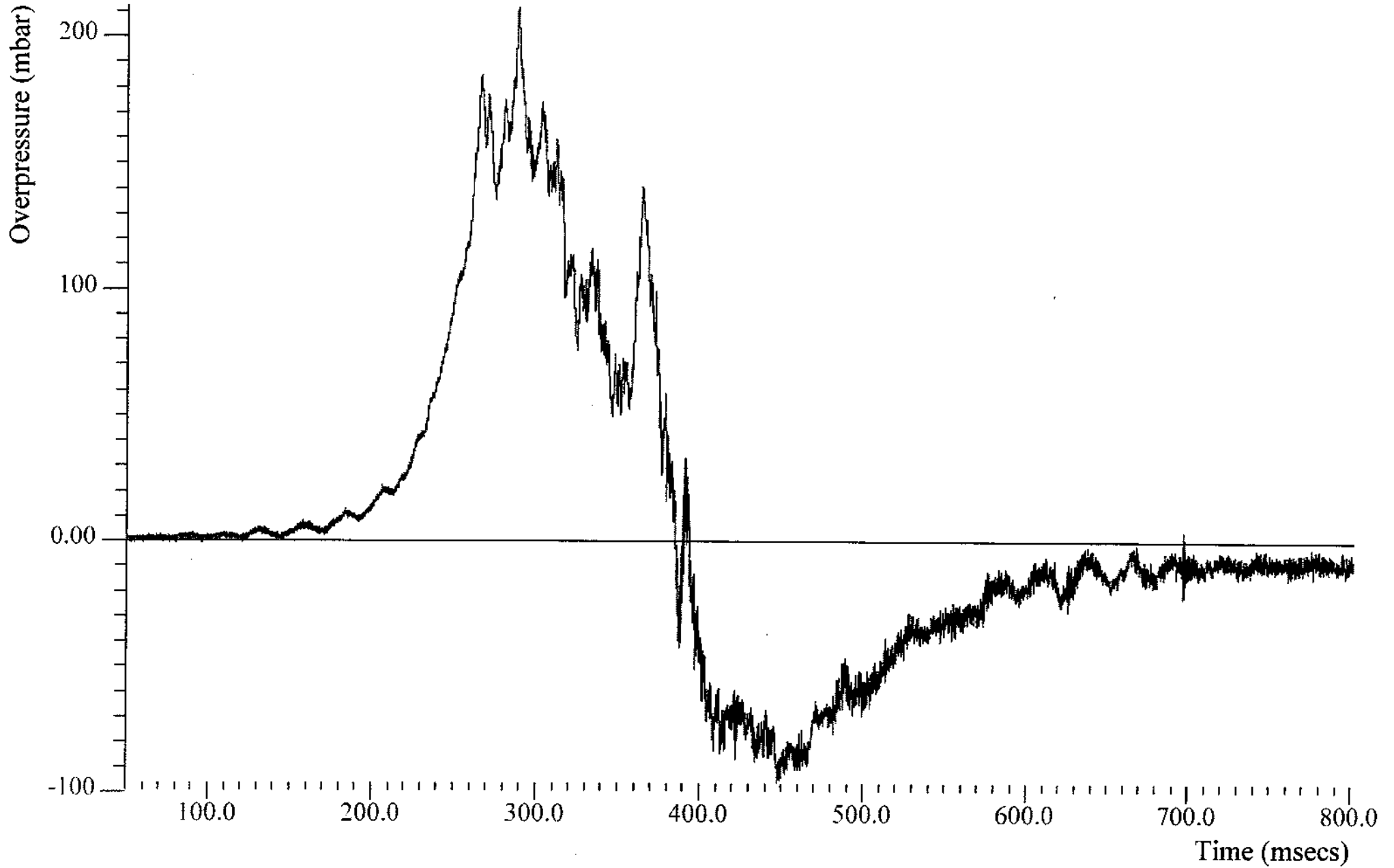
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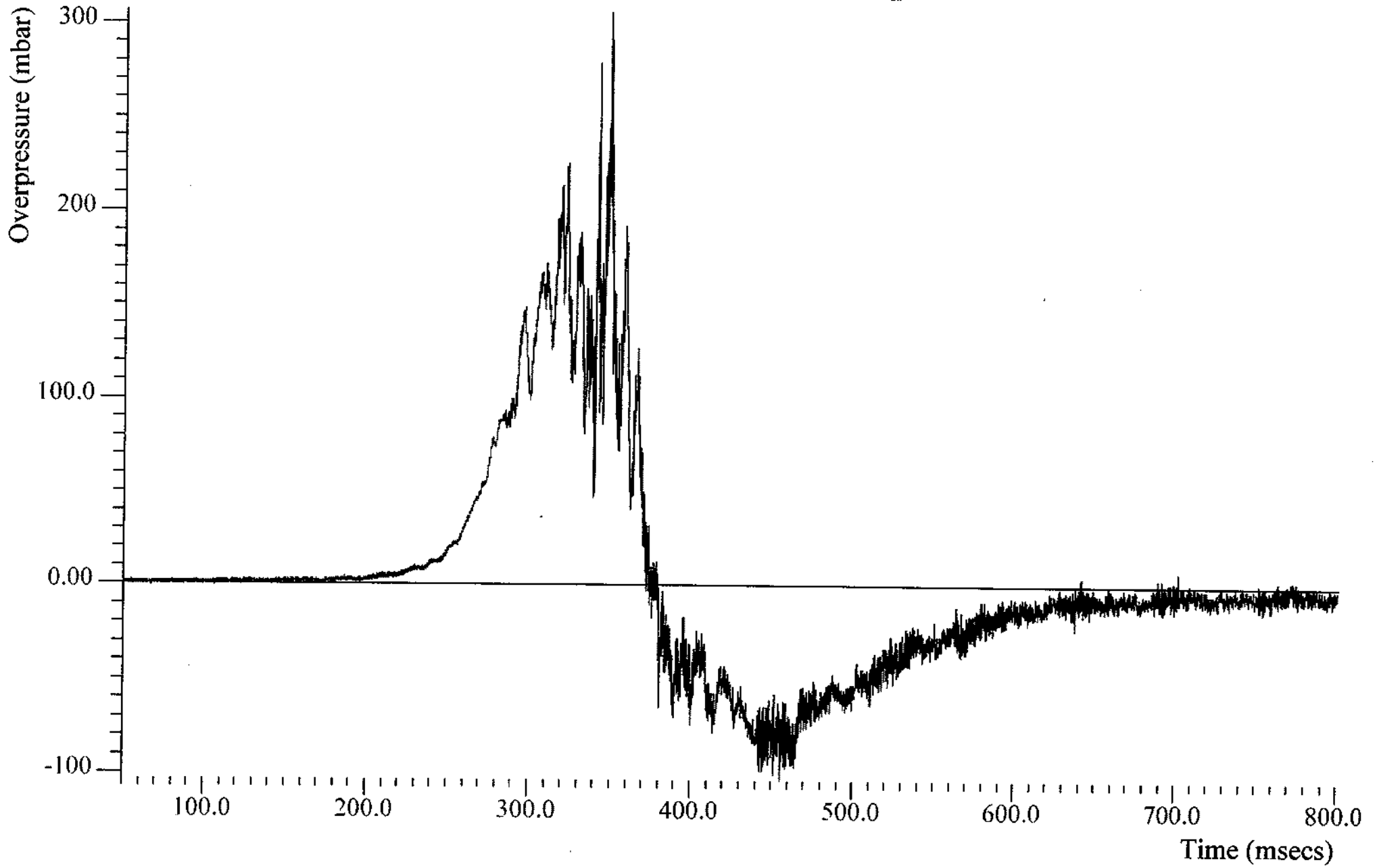
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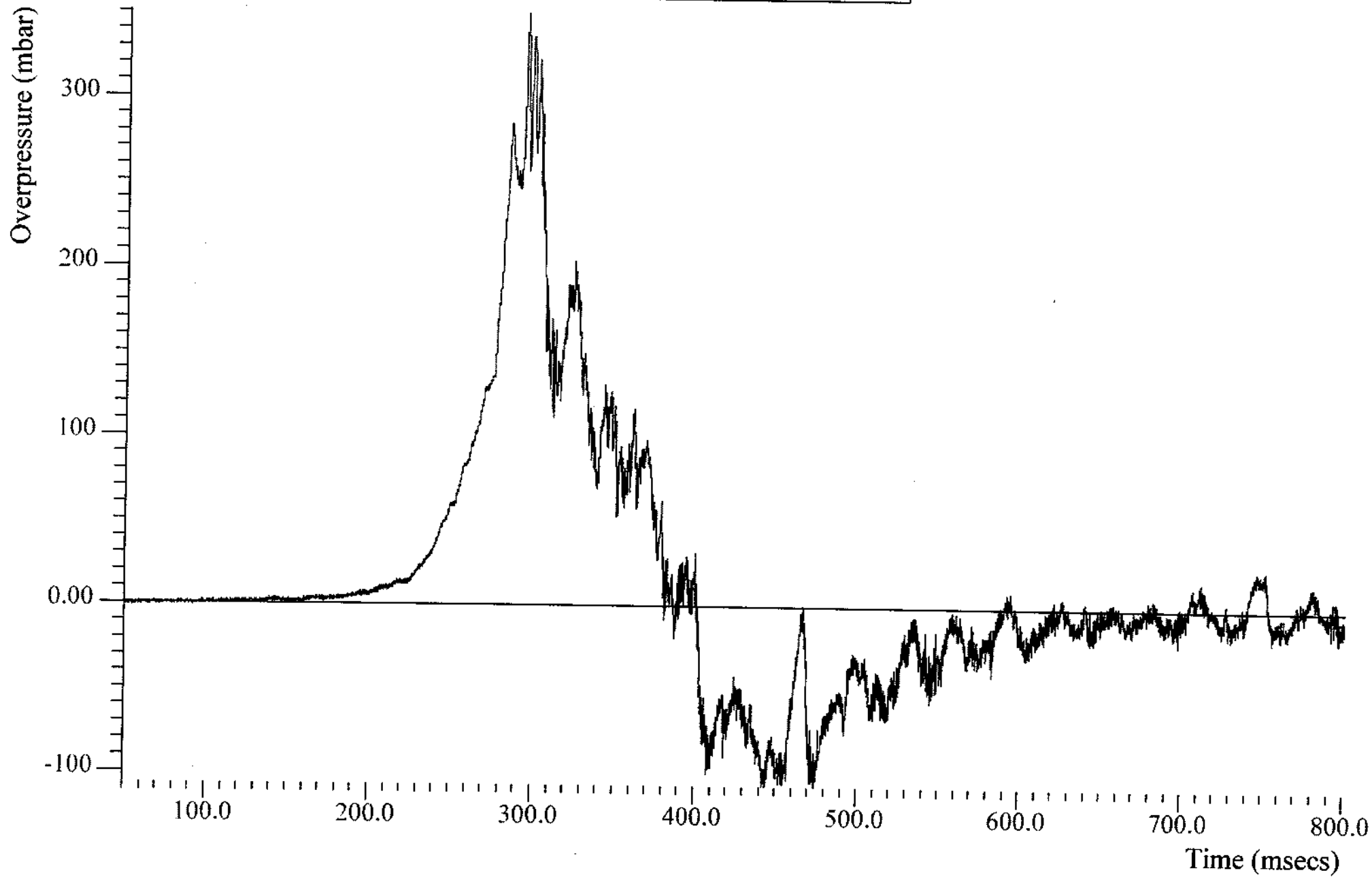
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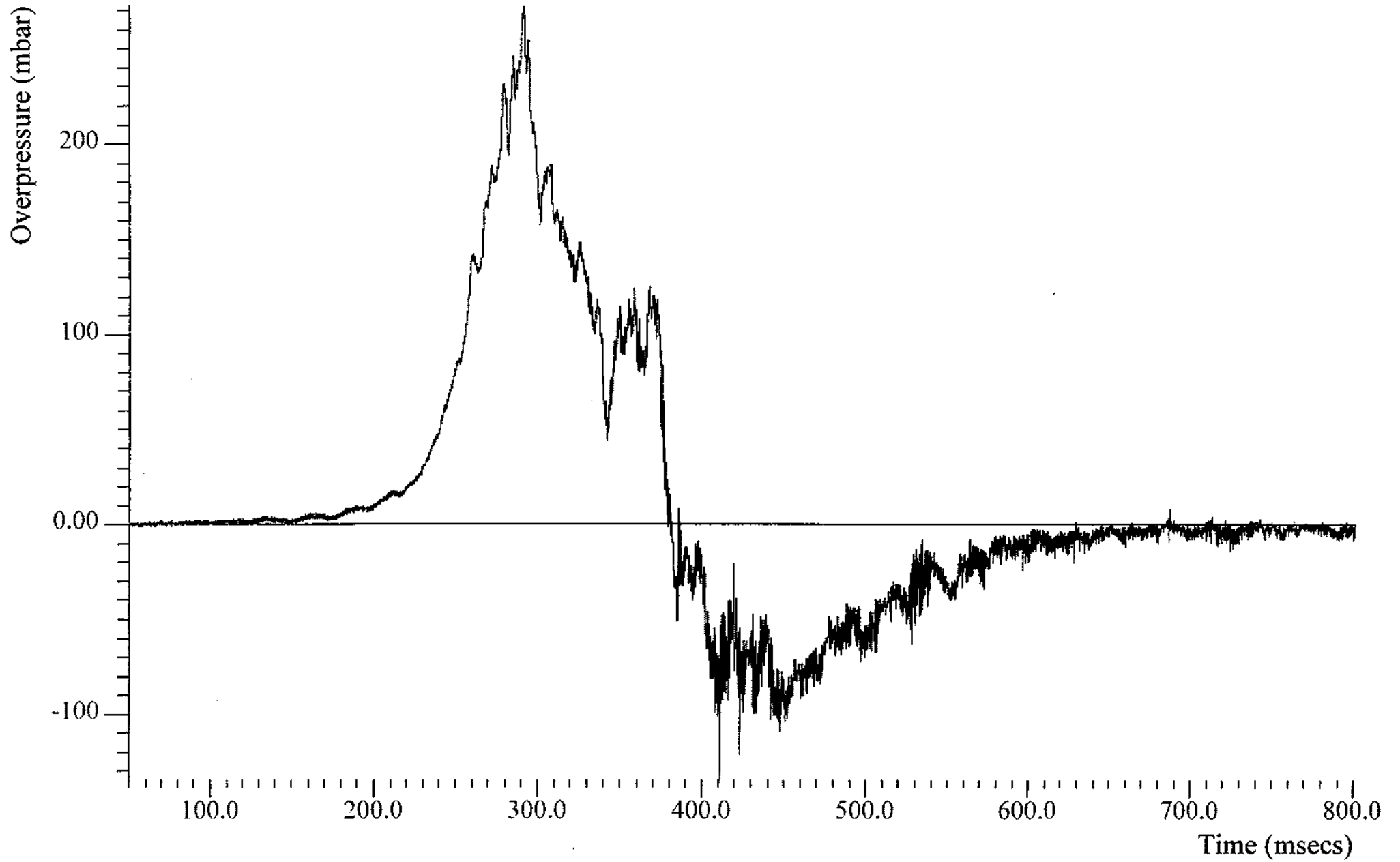
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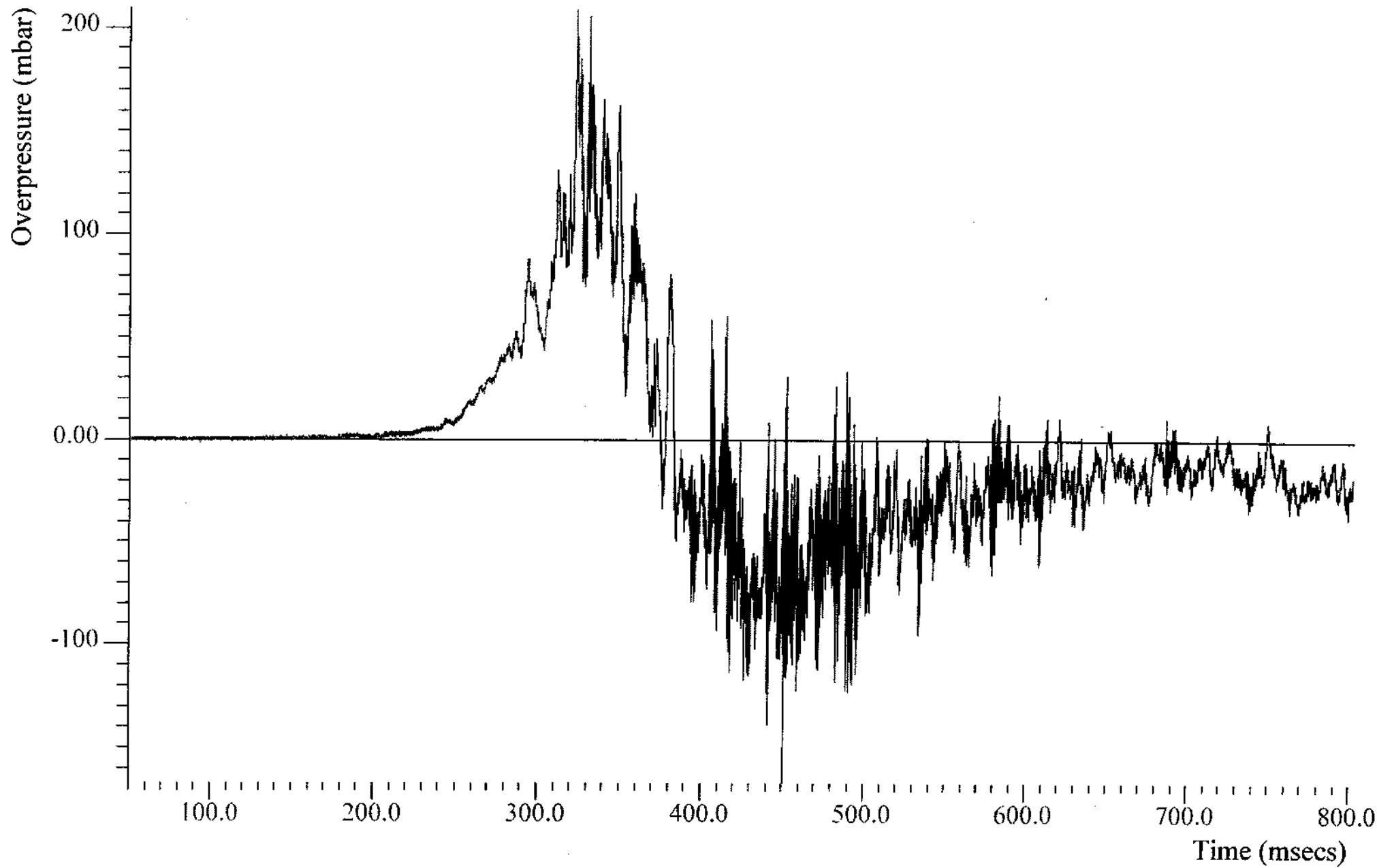
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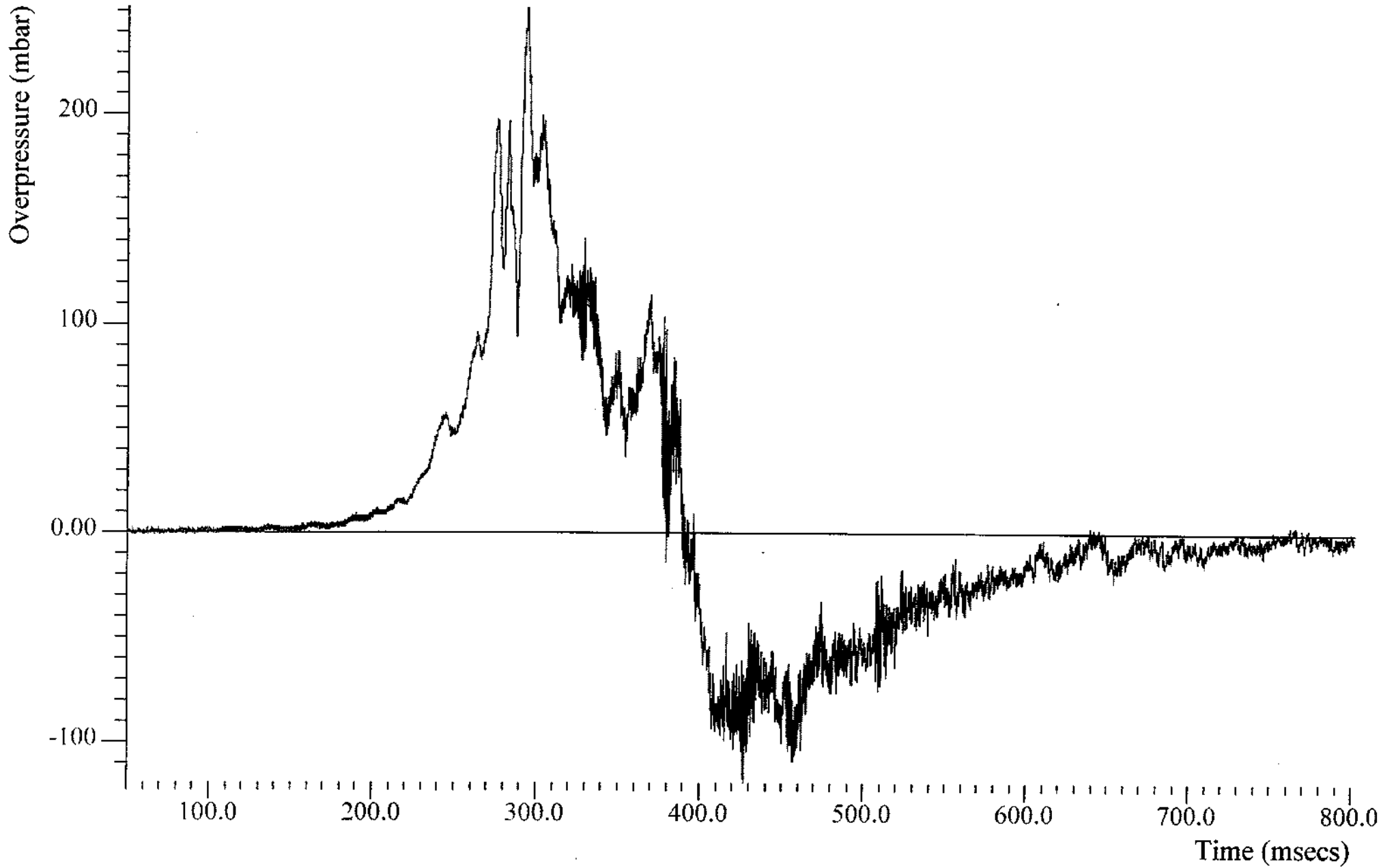
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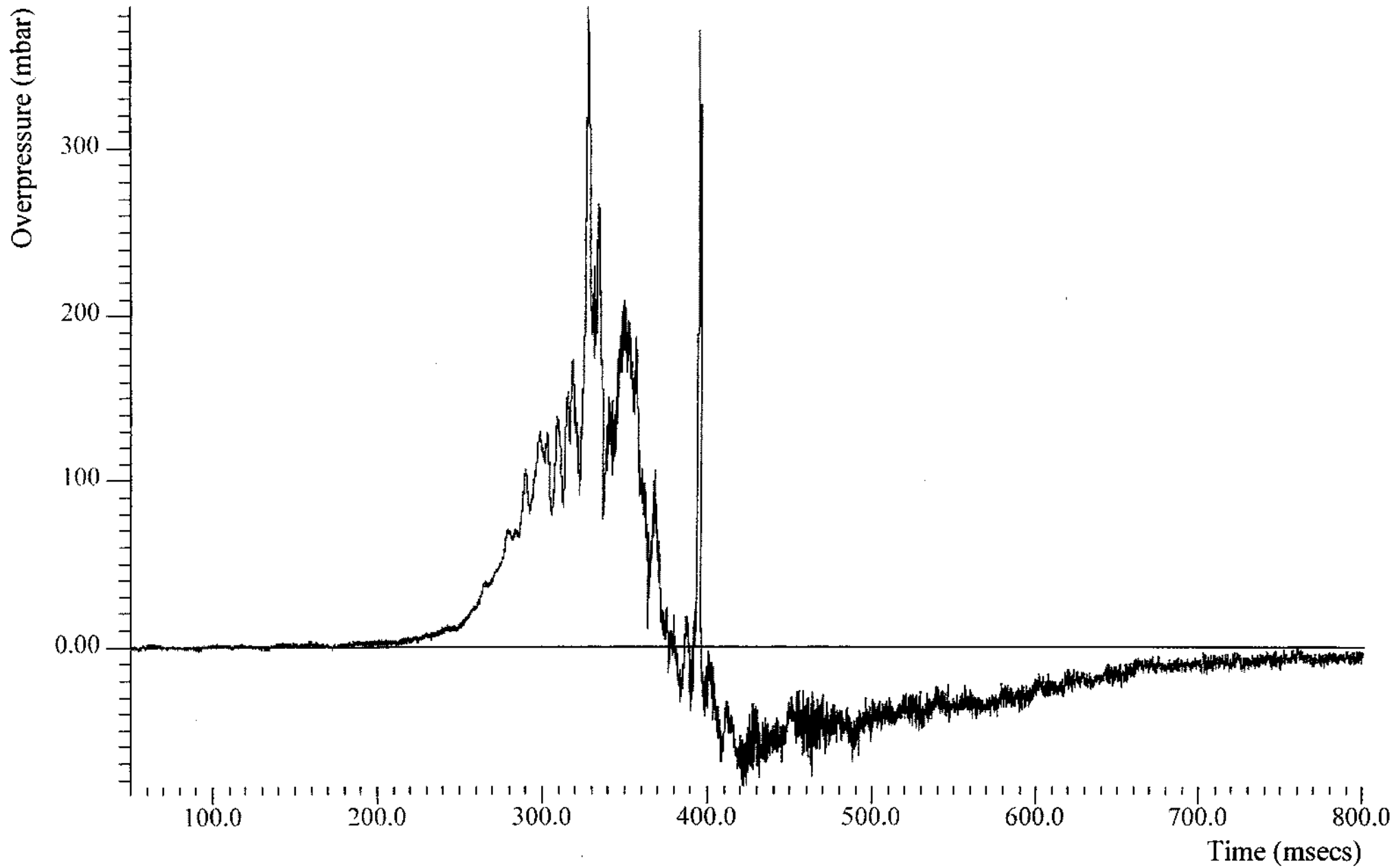
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Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PI-34

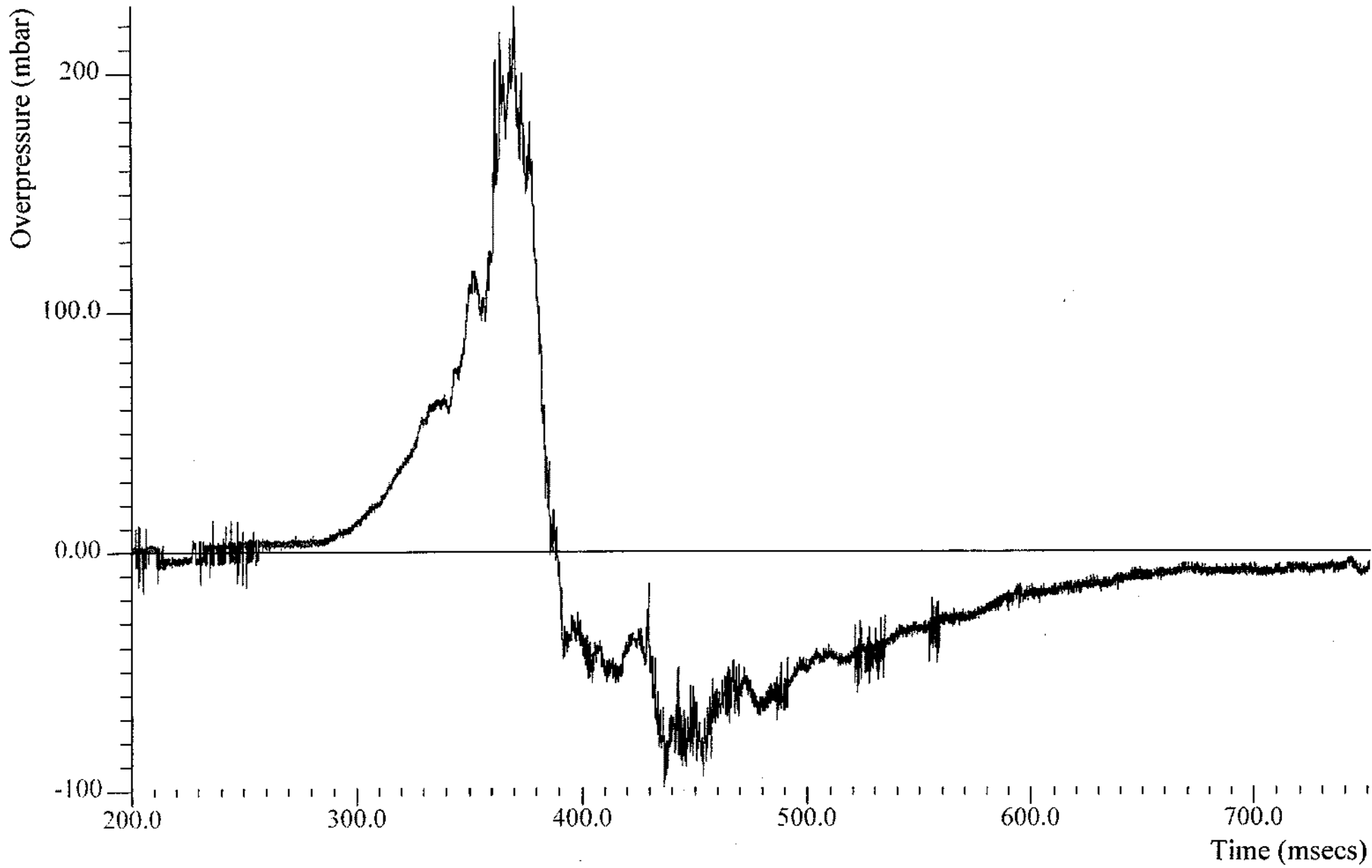


Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PI-35

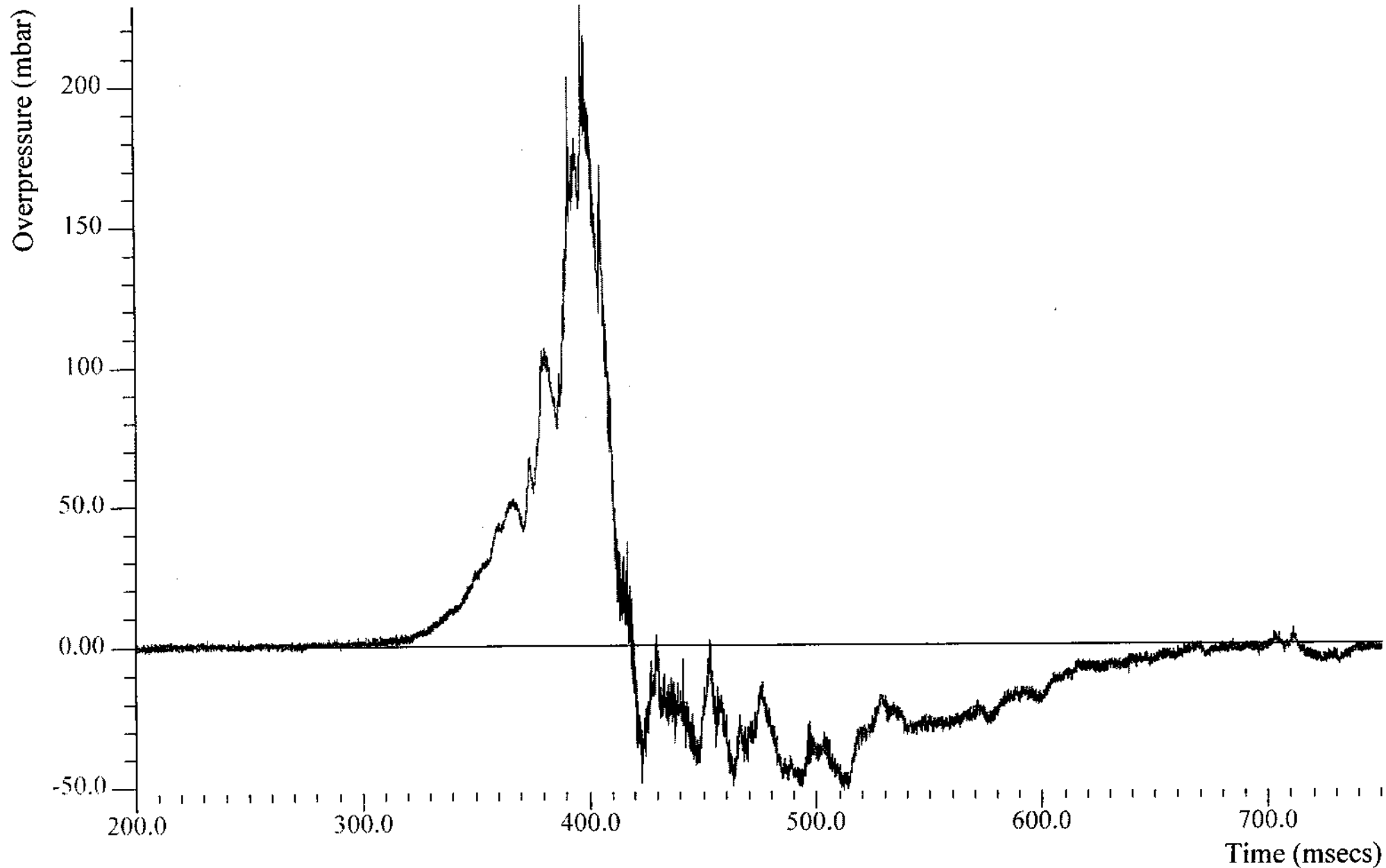


Appendix B: External Overpressure Profiles

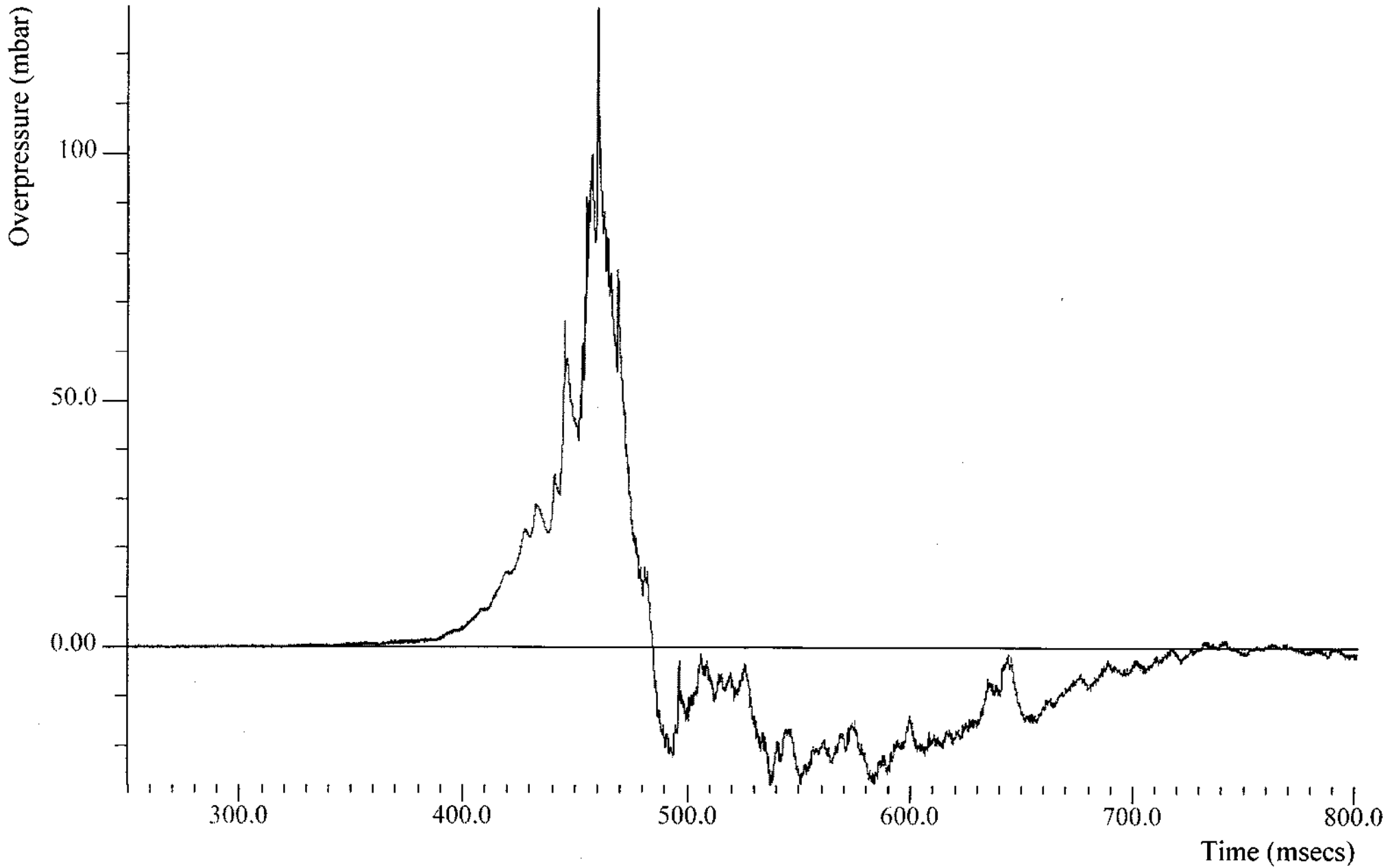
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-2



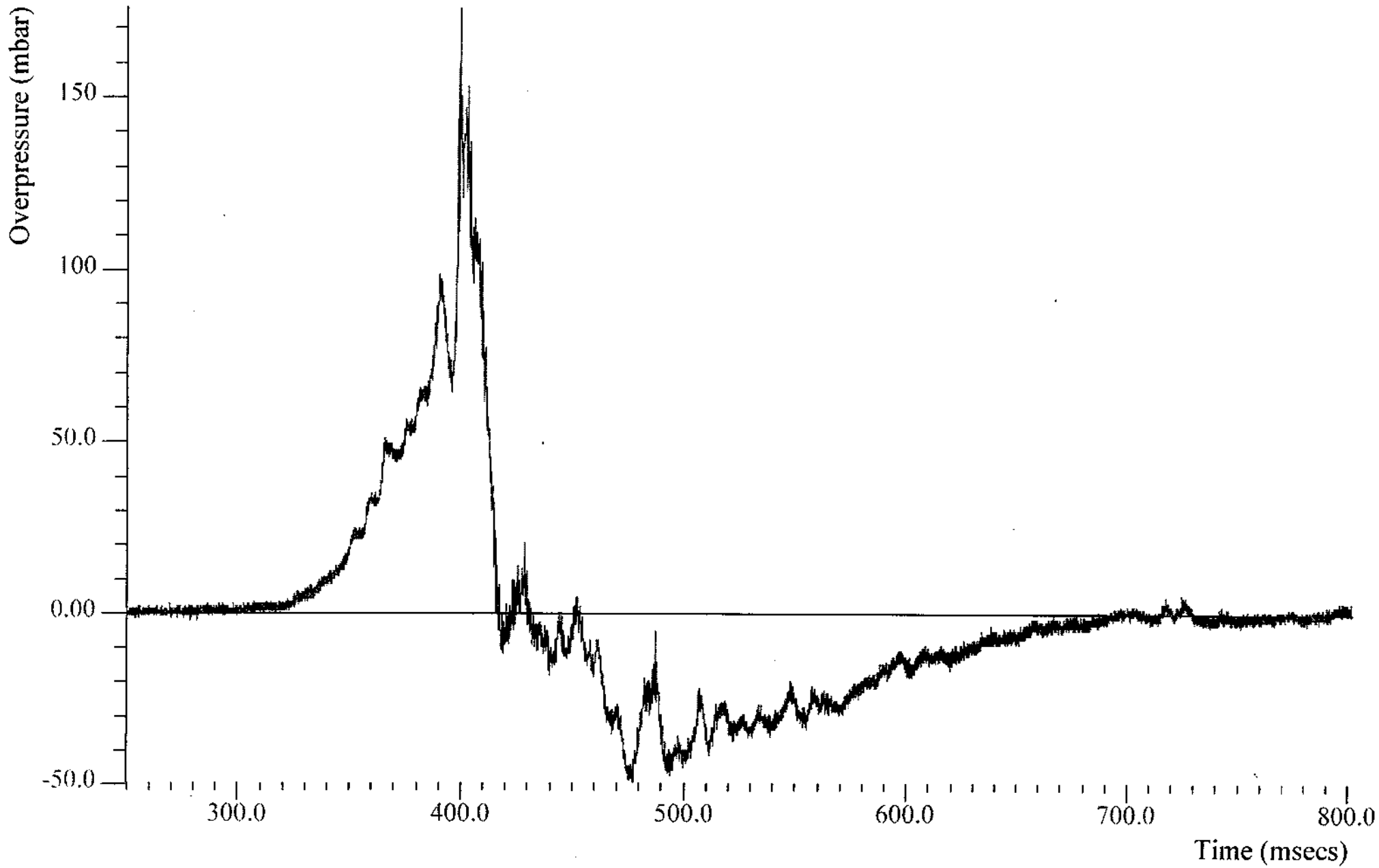
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-3



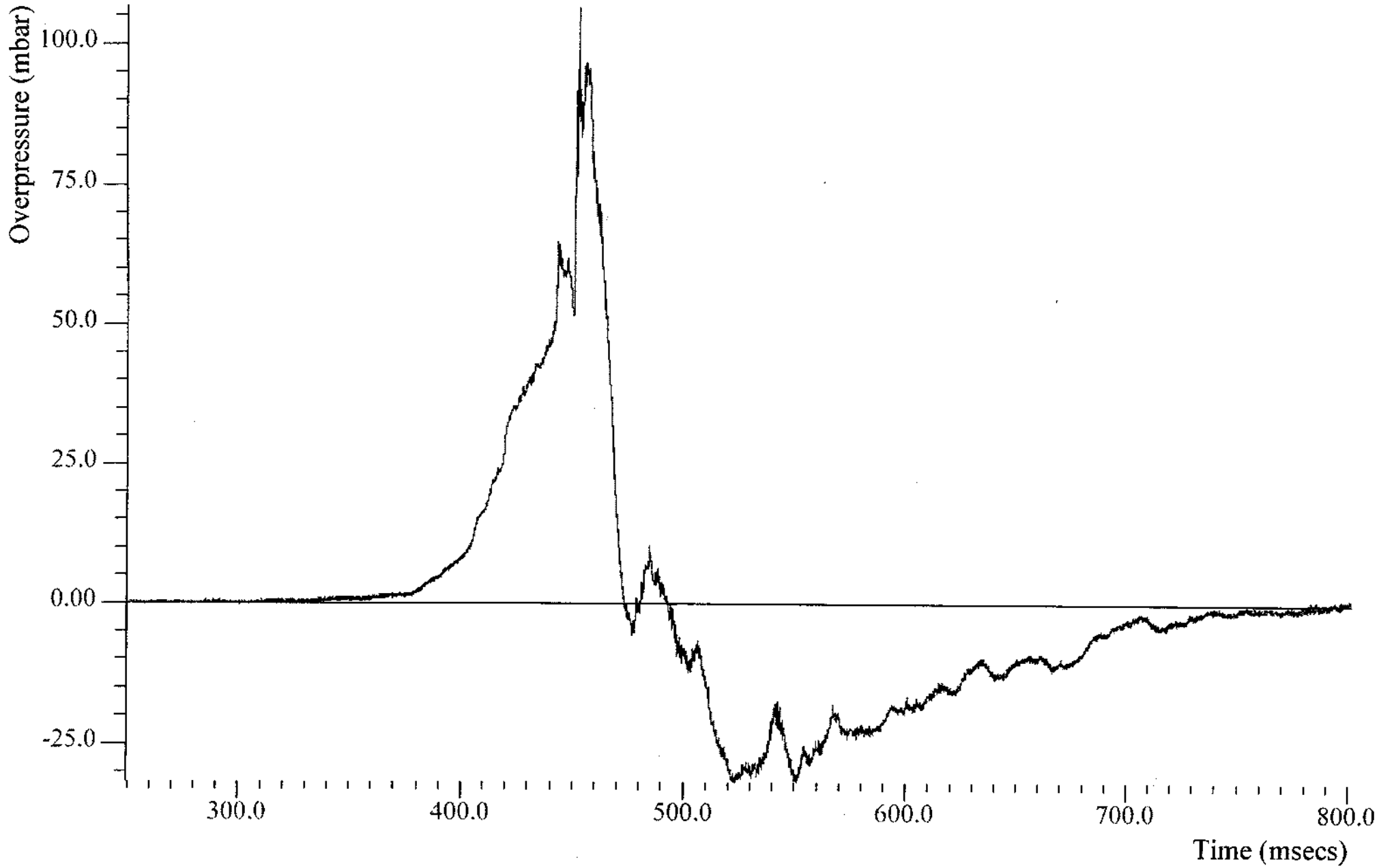
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-4



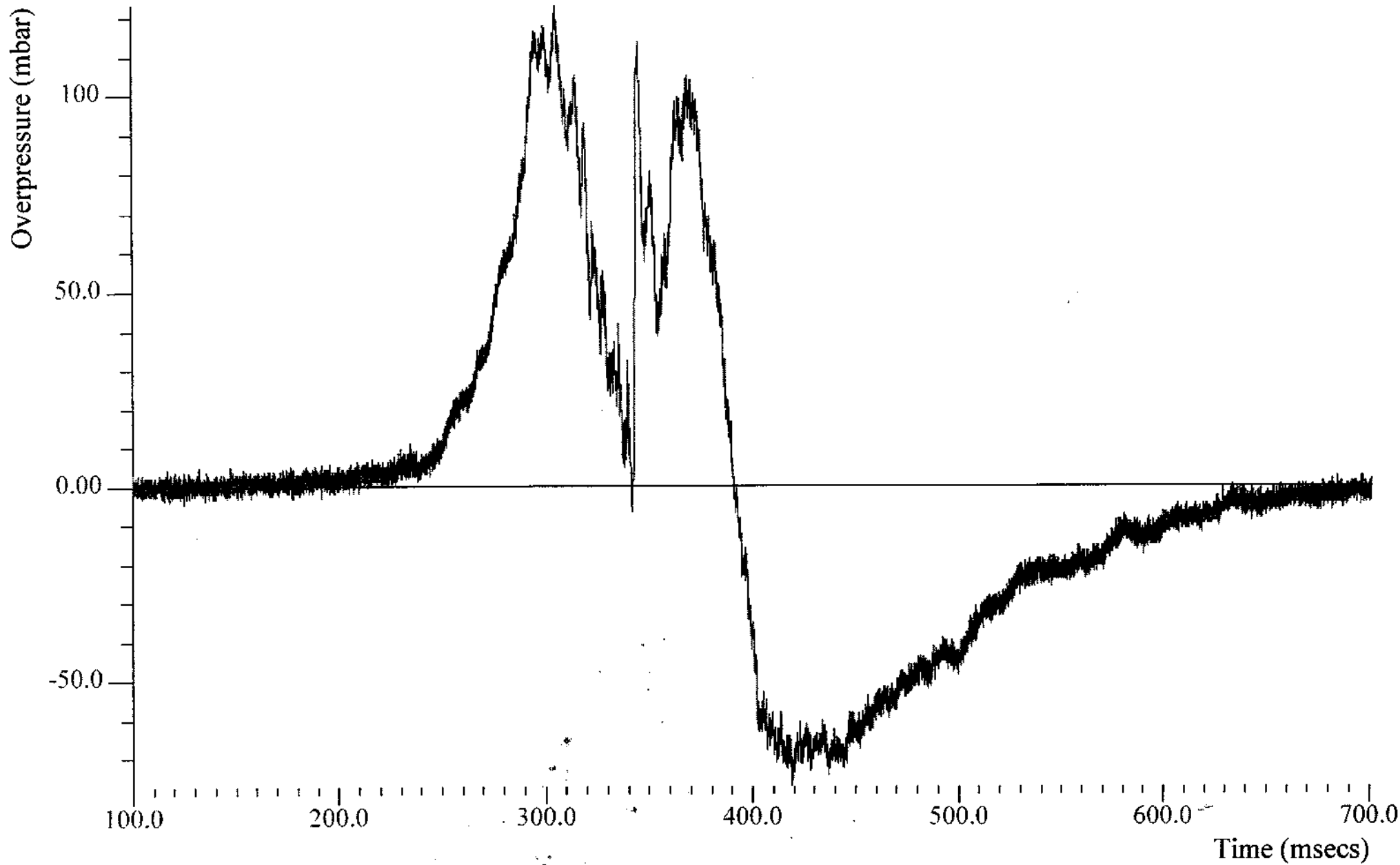
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-5



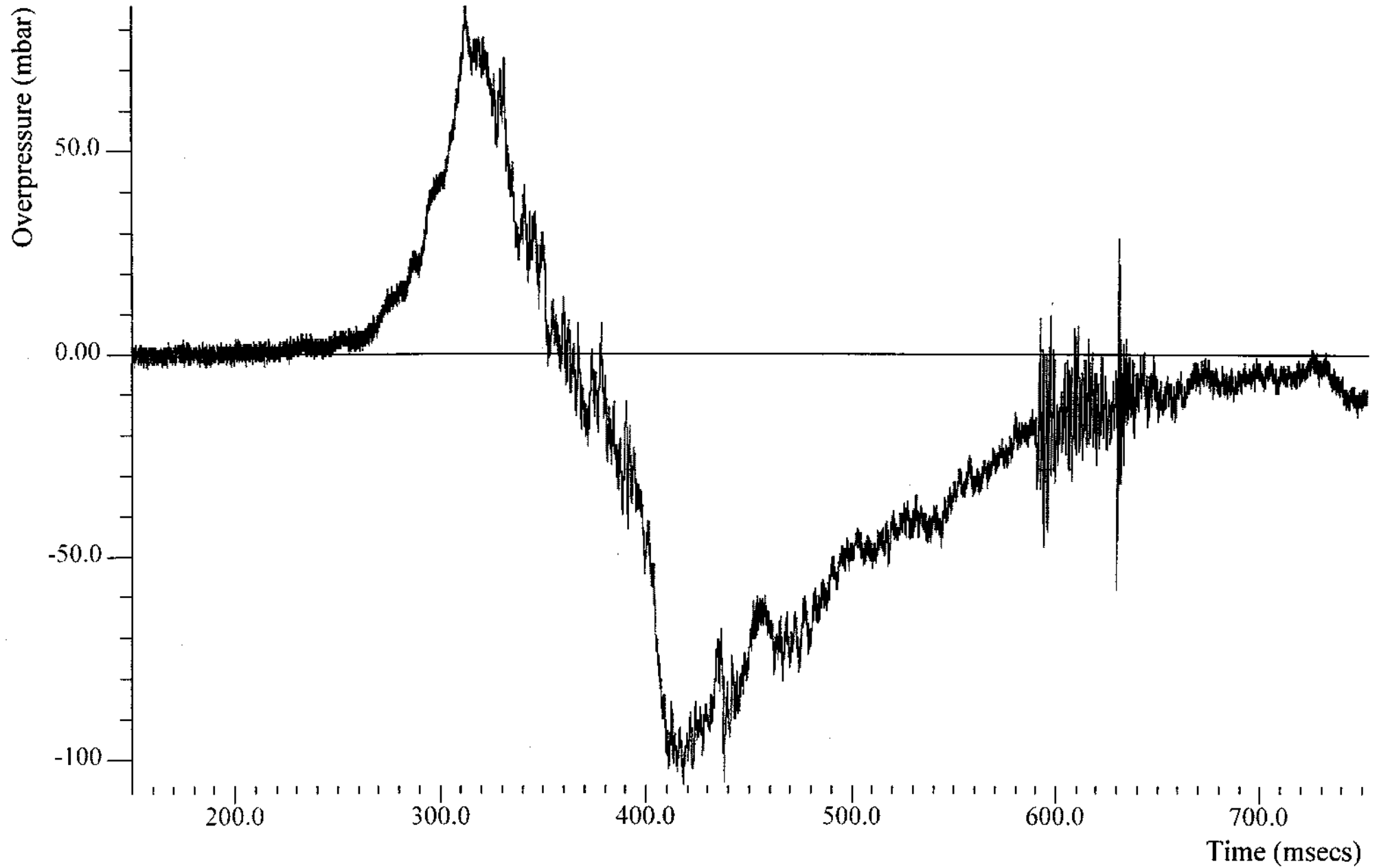
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-6



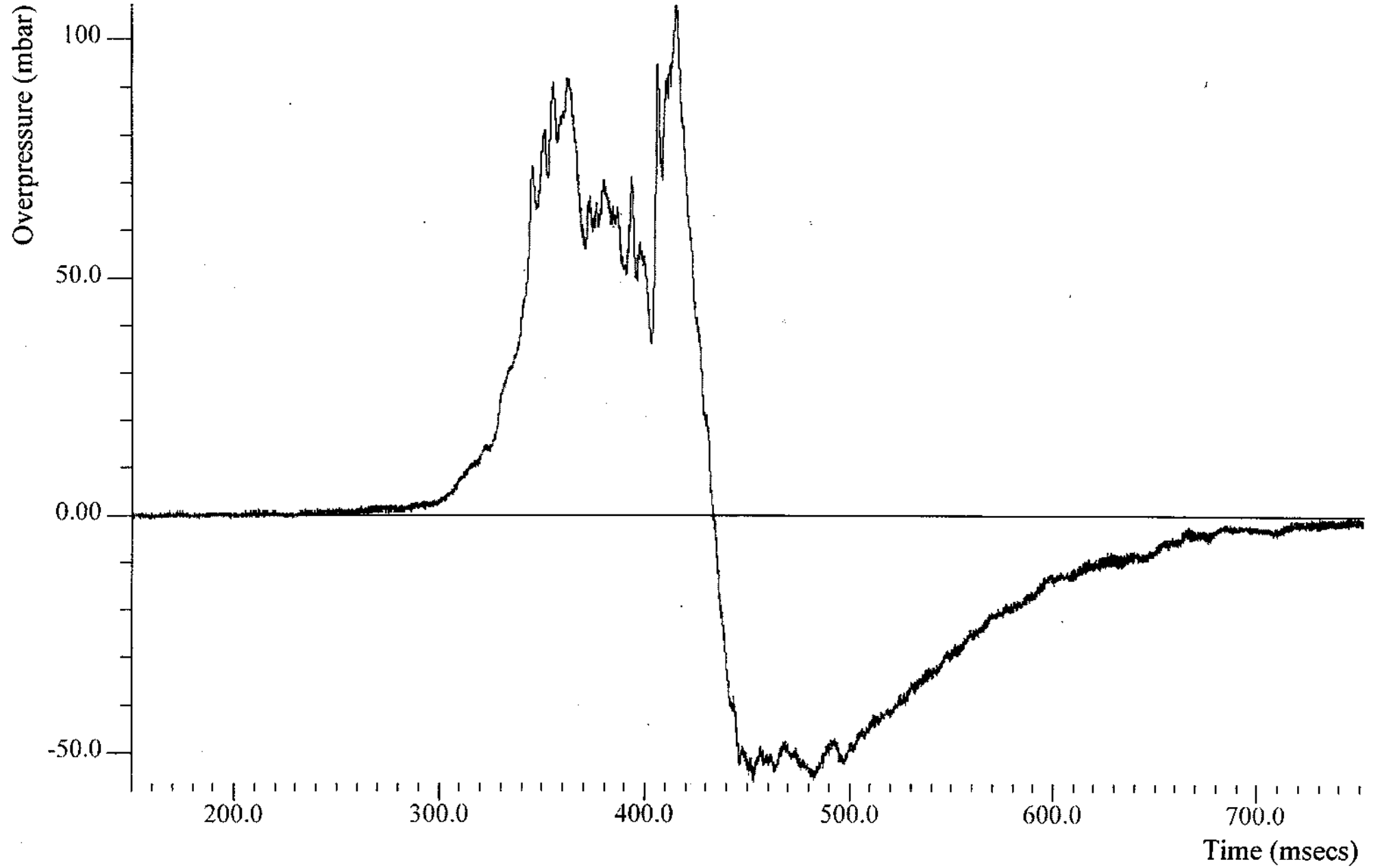
Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-7



Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-8



Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-9



Test: HSE7 (O1, C1, I2, DL2)
Transducer no: PE-11

