

Time (μs)	Trough_radius (mm)	Crest_radius (mm)
160.2		
180.2		
200.2		
220.2	173.0970256	173.4737028
240.2		
260.2		
280.2		
300.2		
320.2	162.1650582	162.728906
340.2		
360.2		
380.2		
400.2		
420.2	151.4414336	152.2110123
440.2		
460.2		
480.2		
500.2		
520.2	141.0160386	141.949306
540.2		
560.2		
580.2		
600.2		
620.2	131.0607813	132.2112144
640.2		
660.2		
680.2		
700.2		
720.2	121.443093	122.7861987
740.2		
760.2		
780.2		
800.2		
820.2	112.4284299	113.8147692
840.2		
860.2		
880.2		
900.2		
920.2	104.2726306	105.4841279
940.2		
960.2		
980.2		
1000.2		
1020.2	96.24005913	97.32160572
1040.2		
1060.2		
1080.2	93.62286327	94.46452178
1100.2		

1120.2		
1140.2	89.74947849	90.22466829
1160.2		
1180.2		
1200.2	86.54011708	86.62063935
1220.2		
1240.2		
1260.2	83.51485571	82.96823287
1280.2		
1300.2	83.10671498	82.10982534
1320.2	82.16621545	80.99766864



Mean radius for reference (mm)	Data fitting is adopted to acquire effective velocity and acceleration	Fitting time ( $\mu$ s)	Fitting velocity (m/s)
179.62578		150.8191900000000	-104.61281
177.51731		162.7383800000000	-104.85607
175.22875		174.6575800000000	-105.07421
173.28536		186.5767700000000	-105.27561
171.0963		198.4959600000000	-105.45599
169.11115		210.4151500000000	-105.6112
166.69551		222.3343400000000	-105.75379
164.49918		234.2535400000000	-105.87124
162.44698		246.1727300000000	-105.96358
160.3551		258.0919200000000	-106.03908
158.14587		270.0111100000000	-106.09362
155.94395		281.9303000000000	-106.12718
154.05313		293.8494900000000	-106.14391
151.826223		305.7686900000000	-106.13552
149.71899		317.6878800000000	-106.1062
147.53775		329.6070700000000	-106.05586
145.55168		341.5262600000000	-105.98455
143.49497		353.4454500000000	-105.89222
141.48267		365.3646500000000	-105.78315
139.43503		377.2838400000000	-105.65315
137.31921		389.2030300000000	-105.49375
135.40127		401.1222200000000	-105.32175
133.41617		413.0414100000000	-105.12874
131.636		424.9606100000000	-104.91061
129.66308		436.8798000000000	-104.67154
127.83792		448.7989900000000	-104.41565
125.95893		460.7181800000000	-104.13879
124.05112		472.6373700000000	-103.84091
122.11465		484.5565700000000	-103.52209
120.42045		496.4757600000000	-103.17815
118.41291		508.3949500000000	-102.81739
116.56706		520.3141400000000	-102.43565
114.81404		532.2333300000000	-102.0287
113.1216		544.1525300000000	-101.60502
111.57813		556.0717200000000	-101.16459
110.09943		567.9909100000000	-100.69896
108.31812		579.9101000000000	-100.21235
107.03461		591.8292900000000	-99.70476
104.87838		603.7484800000000	-99.17197
103.55004		615.6676800000000	-98.62663
102.13193		627.5868700000000	-98.06035
100.31022		639.5060600000000	-97.46468
98.65663		651.4252500000000	-96.85641
96.78083		663.3444400000000	-96.22294
95.68197		675.2636400000000	-95.56853
94.26597		687.1828300000000	-94.89739
94.04369		699.1020200000000	-94.20103
91.53221		711.0212100000000	-93.4879

90. 21744	722. 940400000000	-92.75375
89. 98707	734. 859600000000	-91.99447
88. 09374	746. 778790000000	-91.21425
86. 95109	758. 697980000000	-90.41722
86. 58038	770. 617170000000	-89.59921
85. 04709	782. 536360000000	-88.76019
84. 15081	794. 455560000000	-87.89604
83. 24154	806. 374750000000	-87.01514
82. 92096	818. 293940000000	-86.11323
82. 60827	830. 213130000000	-85.19035
81. 58194	842. 132320000000	-84.24646
	854. 051520000000	-83.28163
	865. 970710000000	-82.29586
	877. 889900000000	-81.28489
	889. 809090000000	-80.26133
	901. 728280000000	-79.2126
	913. 647470000000	-78.14286
	925. 566670000000	-77.05638
	937. 485860000000	-75.94476
	949. 405050000000	-74.80961
	961. 324240000000	-73.65769
	973. 243430000000	-72.48686
	985. 162630000000	-71.29257
	997. 081820000000	-70.07817
	1009. 001010000000	-68.84277
	1020. 920200000000	-67.58639
	1032. 839390000000	-66.30943
	1044. 758590000000	-65.01152
	1056. 677780000000	-63.69267
	1068. 596970000000	-62.35323
	1080. 516160000000	-60.99324
	1092. 435350000000	-59.61183
	1104. 354550000000	-58.20989
	1116. 273740000000	-56.78742
	1128. 192930000000	-55.34353
	1140. 112120000000	-53.87908
	1152. 031310000000	-52.39448
	1163. 950510000000	-50.8885
	1175. 869700000000	-49.36116
	1187. 788890000000	-47.81365
	1199. 708080000000	-46.24559
	1211. 627270000000	-44.65656
	1223. 546460000000	-43.04653
	1235. 465660000000	-41.41513
	1247. 384850000000	-39.76361
	1259. 304040000000	-38.09151
	1271. 223230000000	-36.39845
	1283. 142420000000	-34.68439

1295.061620000000	-32.94937
1306.980810000000	-31.19381

Fitting acceleration (m/s <sup>2</sup> )	Amplitude (mm)	error bar (mm)
-19355.19448	The values are small and vary slowly, only parts of these moments are measured	
-17599.15746		
-16015.40991		
-14077.85573		
-12492.23597	Here, the error bar of amplitude is considered as half pixel	
-10908.47056		
-8800.51712		
-7040.79091		
-5455.16909	0.18834	0.145
-3695.43713		
-2109.81051		
-350.07855		
1581.89026	0.28192	0.145
3341.62303		
5103.2227		
6864.81809		
8448.57139	0.38479	0.145
10028.60458		
12140.28906		
13901.88253		
15311.51809	0.46663	0.145
17247.21217		
19179.2204		
20762.99105		
22348.59596	0.57522	0.145
24110.15525		
25869.87076		
27801.92607		
29561.67531	0.67155	0.145
31147.25579		
33084.75639		
34844.46628		
36248.66786	0.69317	0.145
38008.42248		
39945.91562		
41705.64759		
43643.09791	0.60575	0.145
45226.82811		
46631.13237		
48742.83989		
50504.30742	0.54077	0.145
52089.75945		
54025.43043		
55605.81352		
57365.58033	0.42083	0.145
59126.99405		
60712.38503		

62648.05056		
64580.50383	0.23759	0.145
66164.30305		
67749.68068		
69510.97459	0.04026	0.145
71446.63457		
73203.25712		
74787.06181	-0.27331	0.145
76548.34051		
78309.55499	-0.49844	0.145
80069.23639	-0.58427	0.145
81826.01957		
83761.77603		
85347.00034		
86930.75911		
88867.83937		
90451.54108		
92208.54122		
94249.8881		
95940.58677		
97437.63452		
99214.90117		
101042.4915		
102767.0922		
104528.0788		
106271.3803		
108013.4468		
109770.8671		
111513.0706		
113238.752		
114999.533		
116759.1913		
118481.6545		
120241.4609		
122002.2172		
123710.0792		
125452.1347		
127245.2431		
128987.4576		
130695.2931		
132437.4277		
134197.9172		
135975.1607		
137715.8084		
139422.8348		
141165.6983		
142926.0406		
144685.6813		



146426.6251