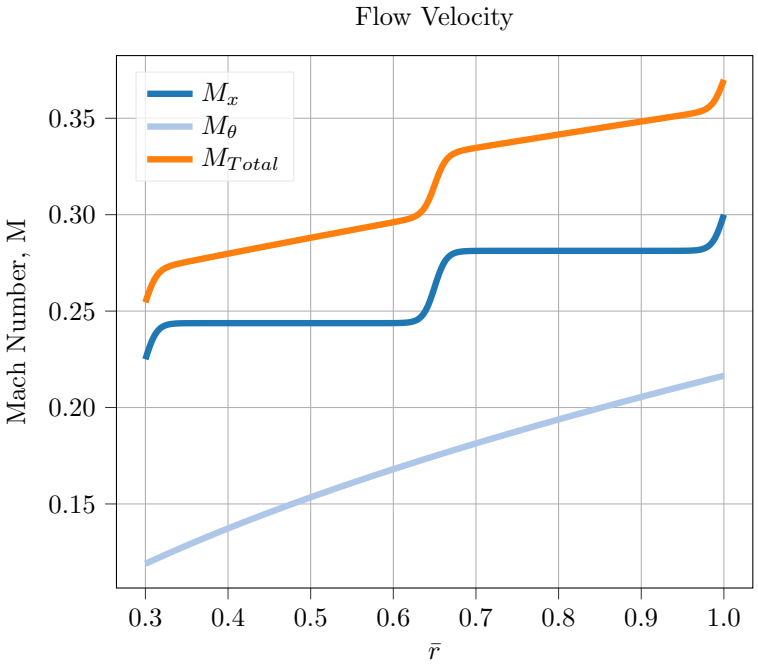
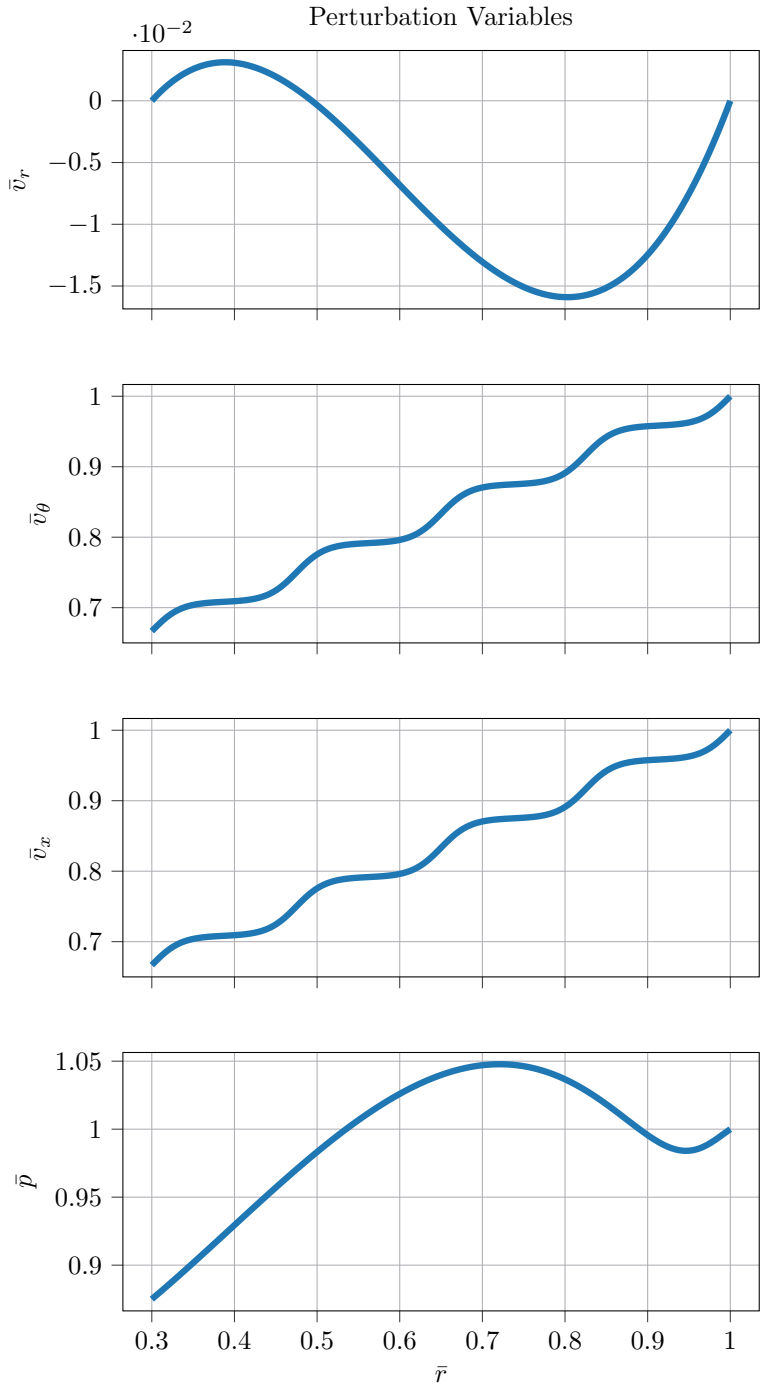


Figure 1: Mach distribution for method of manufactured solution case

1 Results


Perturbation Variables
$\cdot 10^{-2}$
0
−0.5
−1
−1.5
$\bar{v}_r$
1
0.9
0.8
0.7
$\bar{v}_\theta$
1
0.9
0.8
0.7
$\bar{v}_x$
1.05
1
0.95
0.9
$\bar{p}$
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
$\bar{r}$

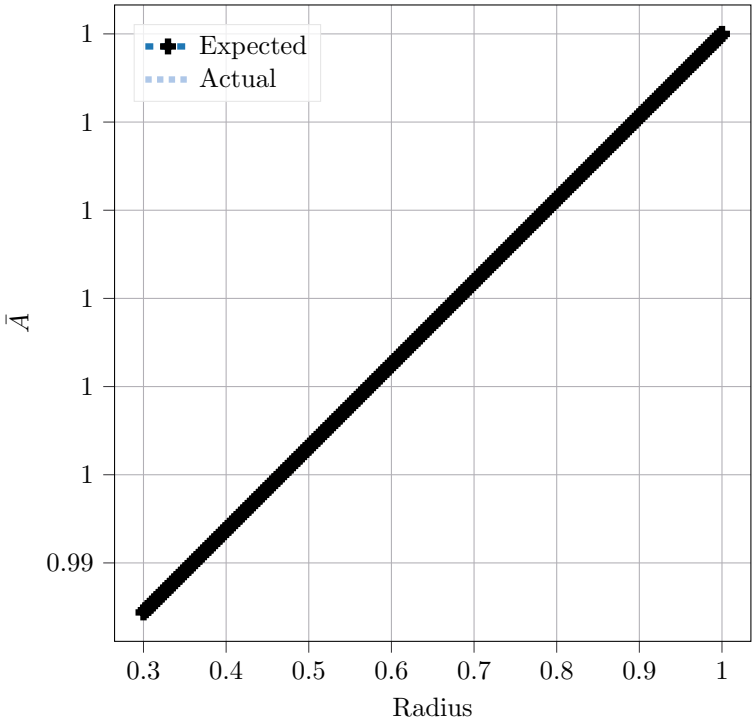


Figure 2: Speed of Sound from Integrating the Tangential Mach Number

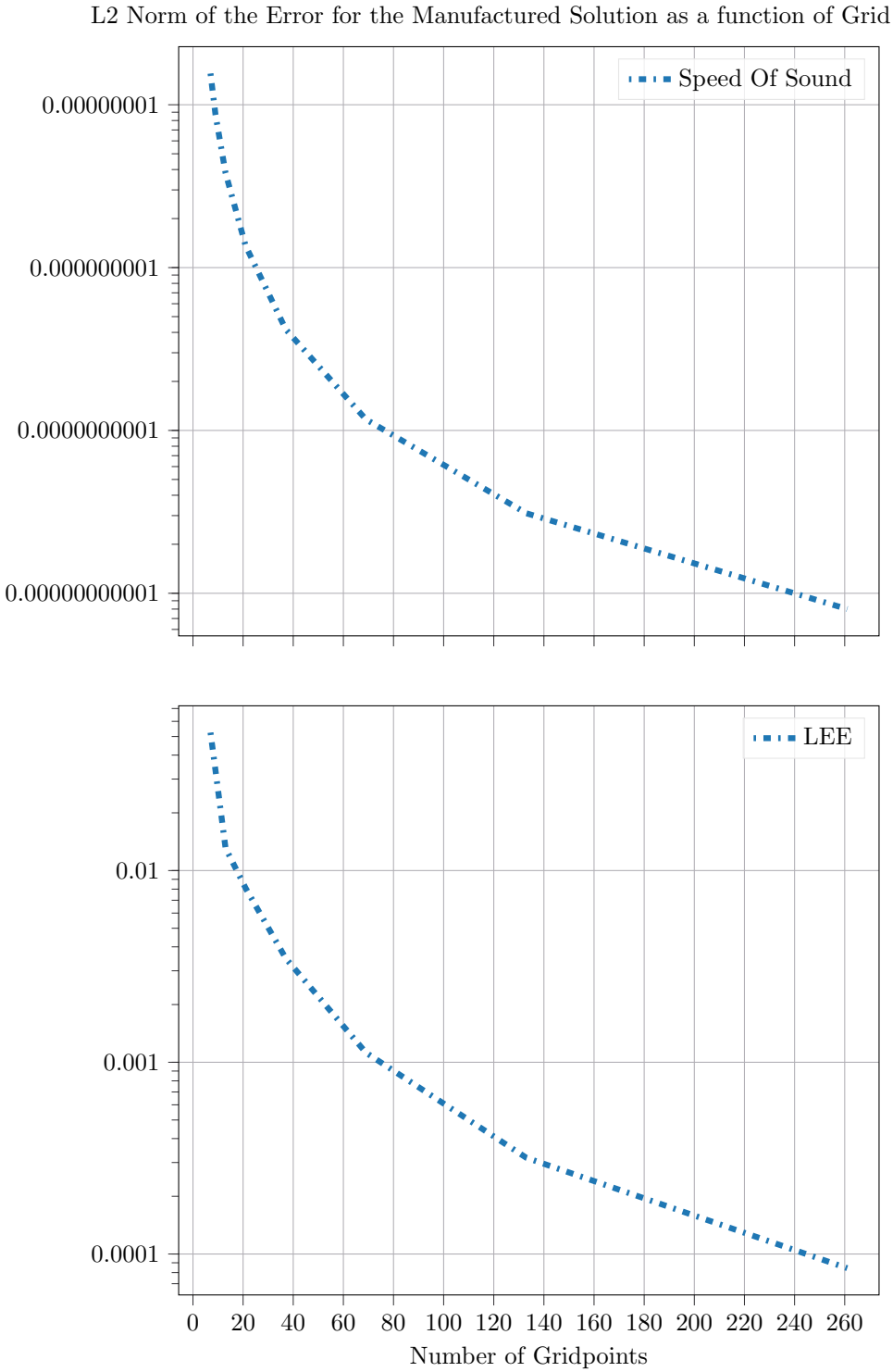


Figure 3: Speed of Sound Expected vs Actual

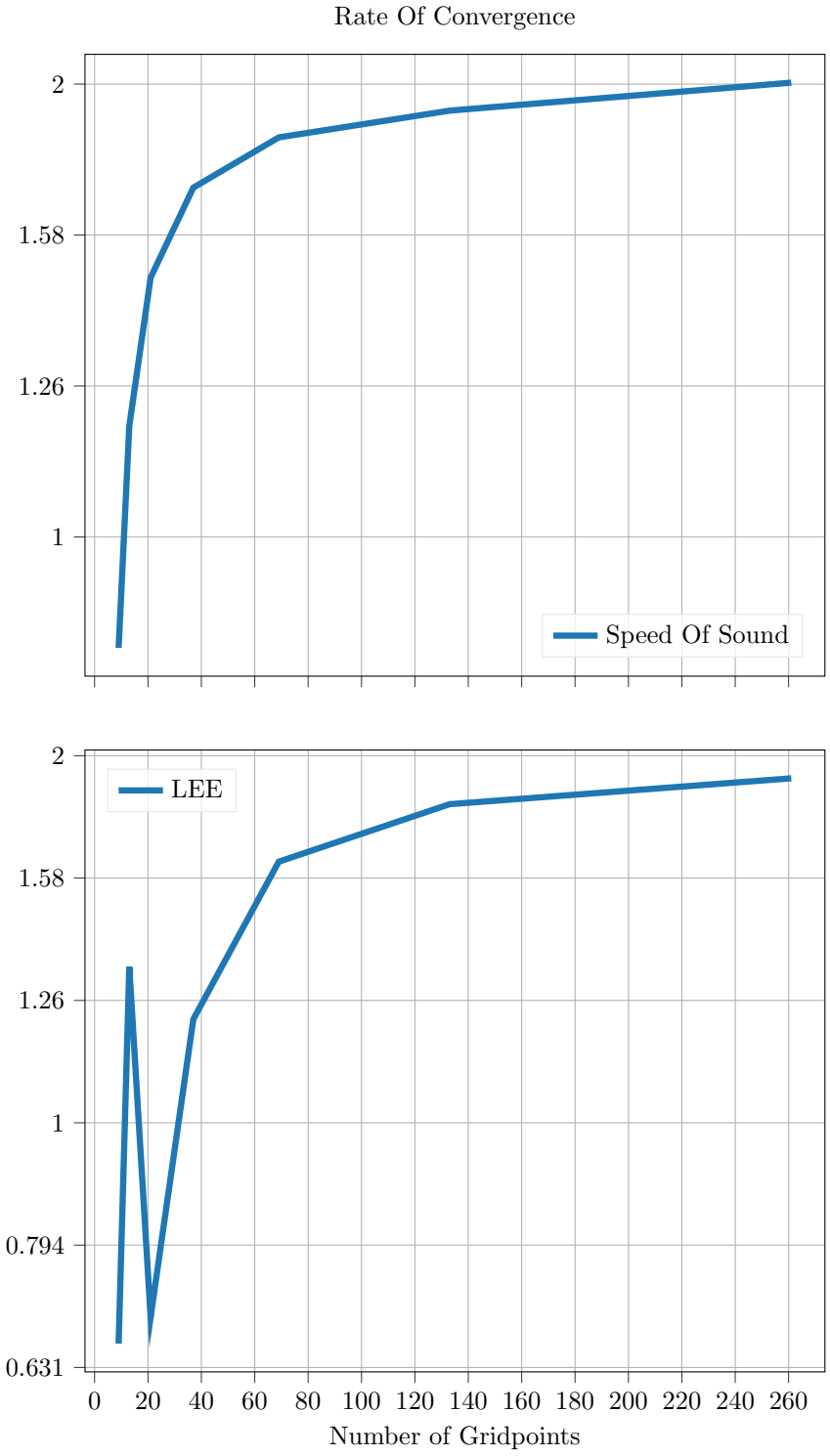


Figure 4: Rate of Convergence for the Speed of Sound Integration

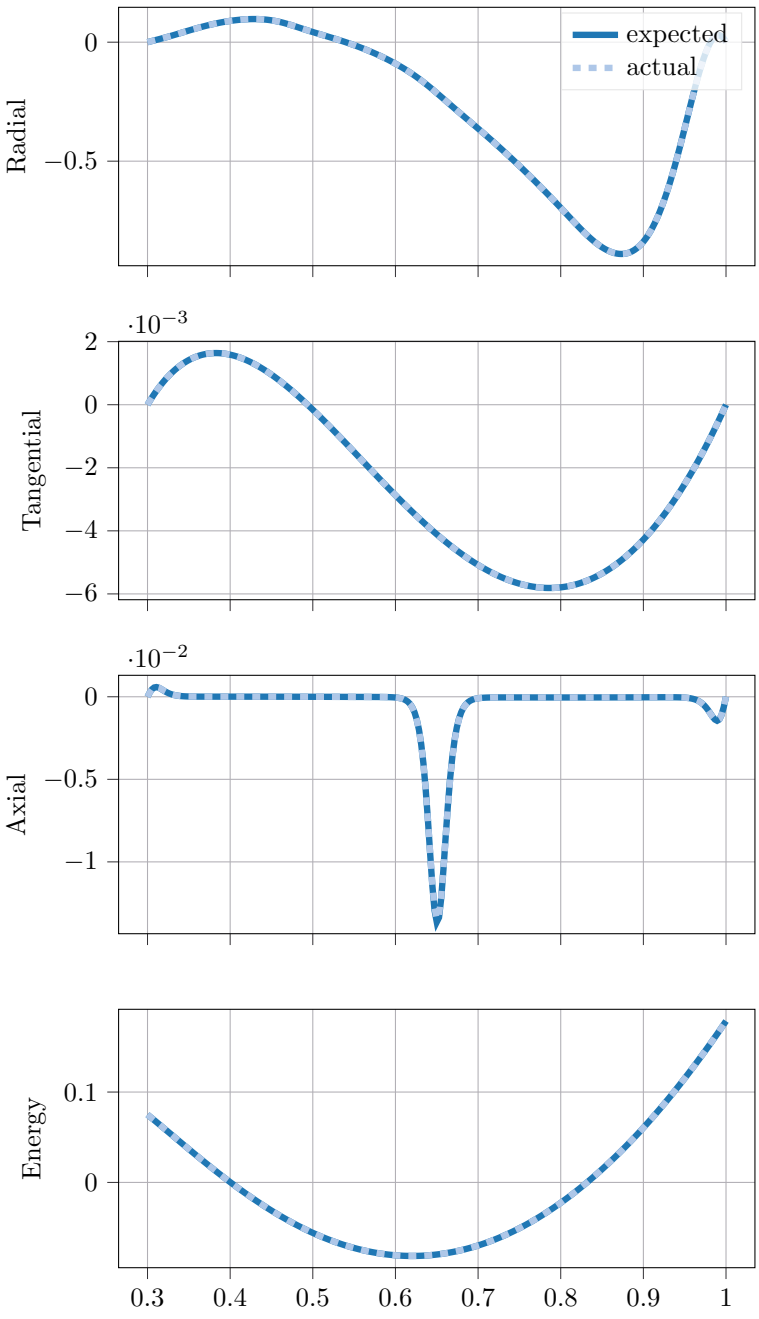
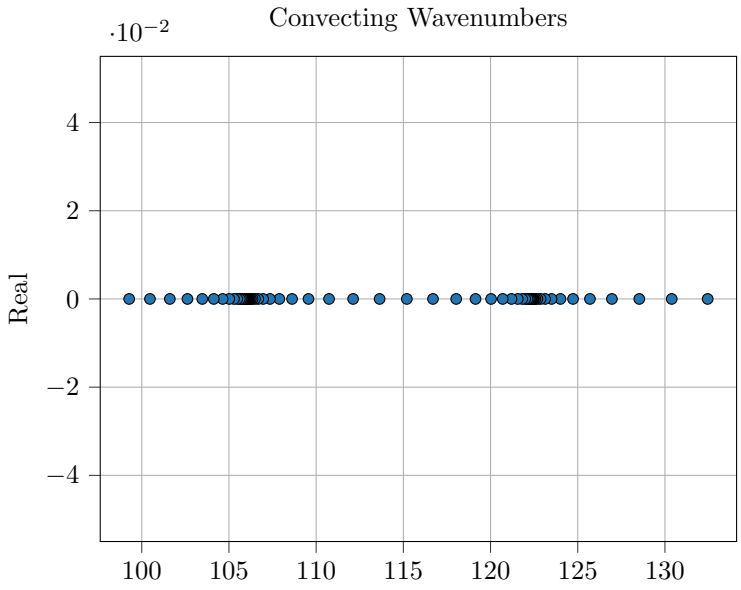
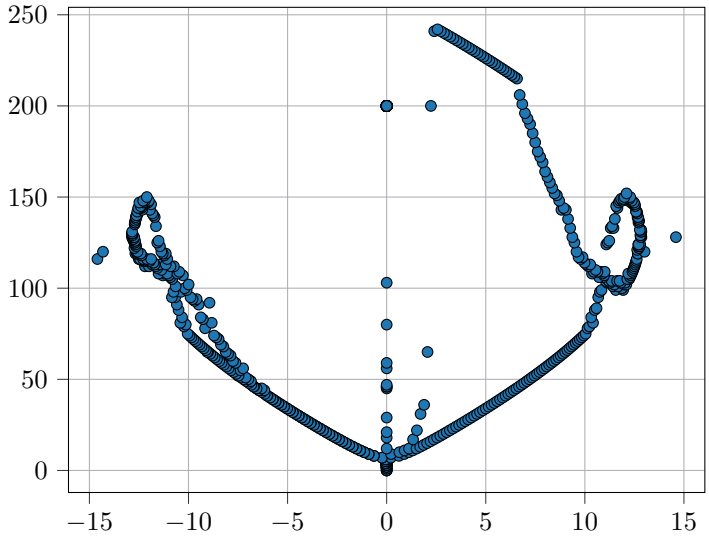


Figure 5: Source Term Error


Convecting Wavenumbers
$\cdot 10^{-2}$
Real
4
2
0
−2
−4
100
105
110
115
120
125
130

	REAL	IMAG
0	132.450	0.0
1	130.390	0.0
2	128.530	0.0
3	126.960	0.0
4	125.700	0.0
5	124.730	0.0
6	124.010	0.0
7	123.500	0.0
8	123.130	0.0
9	122.870	0.0
10	122.690	0.0
11	122.570	0.0
12	122.490	0.0
13	122.440	0.0
14	122.400	0.0
15	122.370	0.0
16	122.360	0.0
17	122.350	0.0
18	122.340	0.0
19	122.340	0.0
20	122.340	0.0
21	122.340	0.0
22	122.340	0.0
23	122.340	0.0
24	122.340	0.0
25	122.340	0.0
26	122.340	0.0
27	122.350	0.0
28	122.350	0.0
29	122.350	0.0
30	122.350	0.0
31	122.350	0.0
32	122.360	0.0
33	122.360	0.0
34	122.360	0.0
35	122.360	0.0
36	122.360	0.0
37	122.360	0.0
38	122.370	0.0
39	122.370	0.0
40	122.370	0.0
41	122.370	0.0
42	122.370	0.0
43	122.370	0.0
44	122.370	0.0
45	122.380	0.0
46	122.380	0.0
47	122.380	0.0
48	122.380	0.0
49	122.380	0.0
50	122.380	0.0
51	122.380	0.0
52	122.380	0.0
53	122.380	0.0


250
200
150
100
50
0
−15
−10
−5
0
5
10
15

#	j	Re{gam}	Im{gam}	Re{gam/ak}	Im{gam/ak}	nz
477	-41.209218	6.452686e-07	-1.373641	2.150895e-08	0	NaN
521	23.663586	6.544730e-03	0.788786	2.181577e-04	0	NaN
1044	0.000000	0.000000e+00	0.000000	0.000000e+00	0	NaN
519	22.893176	2.560026e-01	0.763106	8.533420e-03	1	NaN
478	-40.632545	-2.096128e-01	-1.354418	-6.987093e-03	1	NaN
482	-38.149063	-7.311886e-01	-1.271635	-2.437295e-02	2	NaN
517	22.122615	3.226689e-01	0.737420	1.075563e-02	2	NaN
480	-39.009444	-1.620541e-01	-1.300315	-5.401803e-03	2	NaN
483	-36.399639	-1.121174e+00	-1.213321	-3.737248e-02	3	NaN
515	20.297033	3.307517e-01	0.676568	1.102506e-02	3	NaN
479	-39.666064	0.000000e+00	-1.322202	0.000000e+00	3	NaN
513	17.540043	3.712299e-01	0.584668	1.237433e-02	4	NaN
485	-34.250876	-1.337114e+00	-1.141696	-4.457046e-02	4	NaN
511	13.484742	4.748196e-01	0.449491	1.582732e-02	5	NaN
487	-30.236751	-1.225999e+00	-1.007892	-4.086664e-02	5	NaN
509	7.162415	7.750244e-01	0.238747	2.583415e-02	6	NaN
491	-23.950027	-1.480207e+00	-0.798334	-4.934022e-02	6	NaN
508	-8.406391	-6.550705e+00	-0.280213	-2.183568e-01	7	NaN
507	-5.918783	6.374220e+00	-0.197293	2.124740e-01	7	NaN
505	-10.894282	-7.070367e+00	-0.363143	-2.356789e-01	7	NaN
499	-7.567672	1.870768e+01	-0.252256	6.235894e-01	8	NaN
504	-8.414150	-1.919160e+01	-0.280472	-6.397201e-01	8	NaN
503	-9.228969	-1.935811e+01	-0.307632	-6.452703e-01	8	NaN
502	-8.413980	-2.712833e+01	-0.280466	-9.042778e-01	9	NaN
493	-7.852143	2.663395e+01	-0.261738	8.877985e-01	9	NaN
506	-8.405010	6.550871e+00	-0.280167	2.183624e-01	9	NaN
501	-8.980242	-2.731338e+01	-0.299341	-9.104460e-01	9	NaN
489	-7.975933	3.335763e+01	-0.265864	1.111921e+00	10	NaN
500	-8.413075	1.919202e+01	-0.280436	6.397339e-01	10	NaN
498	-8.415399	-3.386925e+01	-0.280513	-1.128975e+00	10	NaN
497	-8.829505	-3.399273e+01	-0.294317	-1.133091e+00	10	NaN
494	-8.412606	2.712906e+01	-0.280420	9.043019e-01	11	NaN
496	-8.418810	-3.999382e+01	-0.280627	-1.333127e+00	11	NaN
475	-8.079434	3.947656e+01	-0.269314	1.315885e+00	11	NaN
495	-8.760950	-4.014801e+01	-0.292032	-1.338267e+00	11	NaN
474	-8.418796	-4.577180e+01	-0.280627	-1.525727e+00	12	NaN
510	7.062473	1.383179e-04	0.235416	4.610597e-06	12	NaN
490	-8.413191	3.387058e+01	-0.280440	1.129019e+00	12	NaN
471	-8.125746	4.522982e+01	-0.270858	1.507661e+00	12	NaN
473	-8.687055	-4.586301e+01	-0.289568	-1.528767e+00	12	NaN
467	-8.193019	5.075182e+01	-0.273101	1.691727e+00	13	NaN
469	-8.423427	-5.129542e+01	-0.280781	-1.709847e+00	13	NaN
470	-8.649835	-5.141957e+01	-0.288328	-1.713986e+00	13	NaN
461	-8.215661	5.608350e+01	-0.273855	1.869450e+00	14	NaN
465	-8.425526	-5.665487e+01	-0.280851	-1.888496e+00	14	NaN
466	-8.600299	-5.672083e+01	-0.286677	-1.890694e+00	14	NaN
459	-8.267134	6.130442e+01	-0.275571	2.043481e+00	15	NaN
463	-8.430430	-6.187298e+01	-0.281014	-2.062433e+00	15	NaN
464	-8.573035	-6.197304e+01	-0.285768	-2.065768e+00	15	NaN
457	-8.440960	-6.699335e+01	-0.281365	-2.233112e+00	16	NaN
456	-8.280096	6.639839e+01	-0.276003	2.213280e+00	16	NaN
458	-8.528738	-6.704614e+01	-0.284291	-2.234871e+00	16	NaN
453	-8.442632	-7.201791e+01	-0.281421	-2.400597e+00	17	NaN
452	-8.321855	7.143410e+01	-0.277395	2.381137e+00	17	NaN