

Appendix A: Representative Model Building Data with Rocking Wall Design Data

56 representative model buildings are presented, with 116 rocking wall configurations, each with a graph of maximum storey drift vs. rocking wall size.

The storey drifts were determined using the static equivalent seismic loading method, and were based on a location of Los Angeles, California. The story stiffnesses were determined by extrapolation from the code-derived period and the mass of each structure. The constant data used to determine the period of the buildings and seismic loads from *ASCE 7-05* were:

Story Height	3.3m
Occupancy Category	3 (e.g. > 300 people)
1-second Spectral Acceleration S_1	0.75
Short-period Spectral Acceleration S_s	1.5
Site Class	D
LLRS	Concrete Moment Frame
Response Modification Factor R	4
Long Period Transition Period T_L	8

Other constant data were:

Rocking Wall Depth	0.61m
Average Density	400 kg/m ³

The data modified for each model building were:

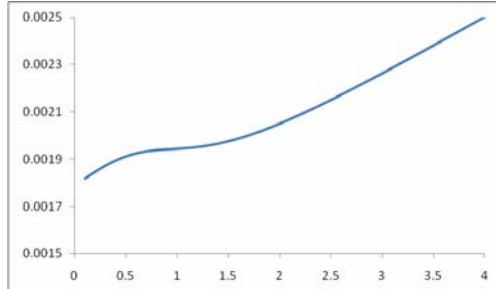
N	Number of stories
Height:width Ratio	2 to 5 stories: 1 6 to 10 stories: 2 11 to 15 stories: 3 (square plan)
m	The single story mass m based on the above.
Stiffness Form (d)	Four different linear stiffness forms were tested, with d (the increase in stiffness of lower stories as a fraction of the upper storey) as 0.0, 0.25, 0.5, and 1.0. Thus only the top story stiffness k_1 is given in the tables. The other stiffnesses can be inferred from k_1 and d.
Number of Rocking Walls	2-5 stories: one pair of rocking walls, 6-10 stories: up to two pairs, 15 stories: up to three pairs.

Each graph has been cropped to show only the most relevant data. It may be noted that the small stiff buildings of 2-4 stories have very low story drifts, but from 5 to 15 stories, all of the data are in the 0.4-0.7% range, and produce some very interesting and sometimes unexpected graphs, which may be confirmed in any finite element software package.

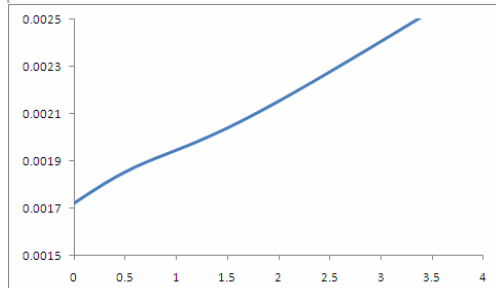
<u>N</u>	<u>Number Walls</u>	<u>d</u>	<u>m</u> (kg)	<u>I</u> ₁ (N/m)	<u>k</u> ₁ (N/m)
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Maximum Story Drift Angle vs. Rocking Wall Width (m)

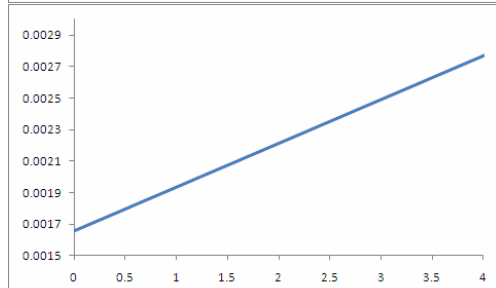
2	2	0	57499	0.2547	5.972E+07
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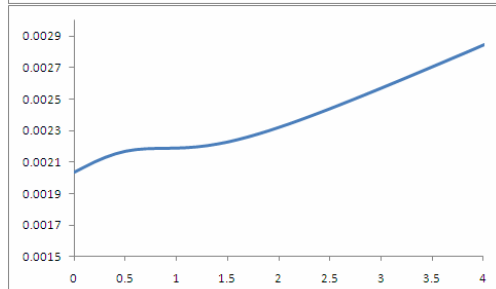
		0.25		0.2547	4.960E+07
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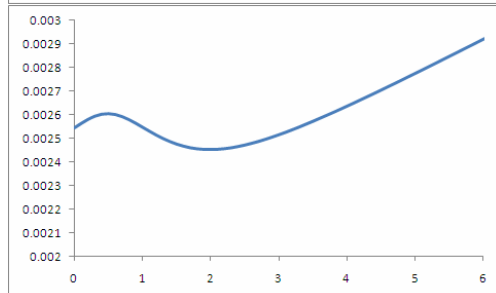
		0.5		0.2547	4.298E+07
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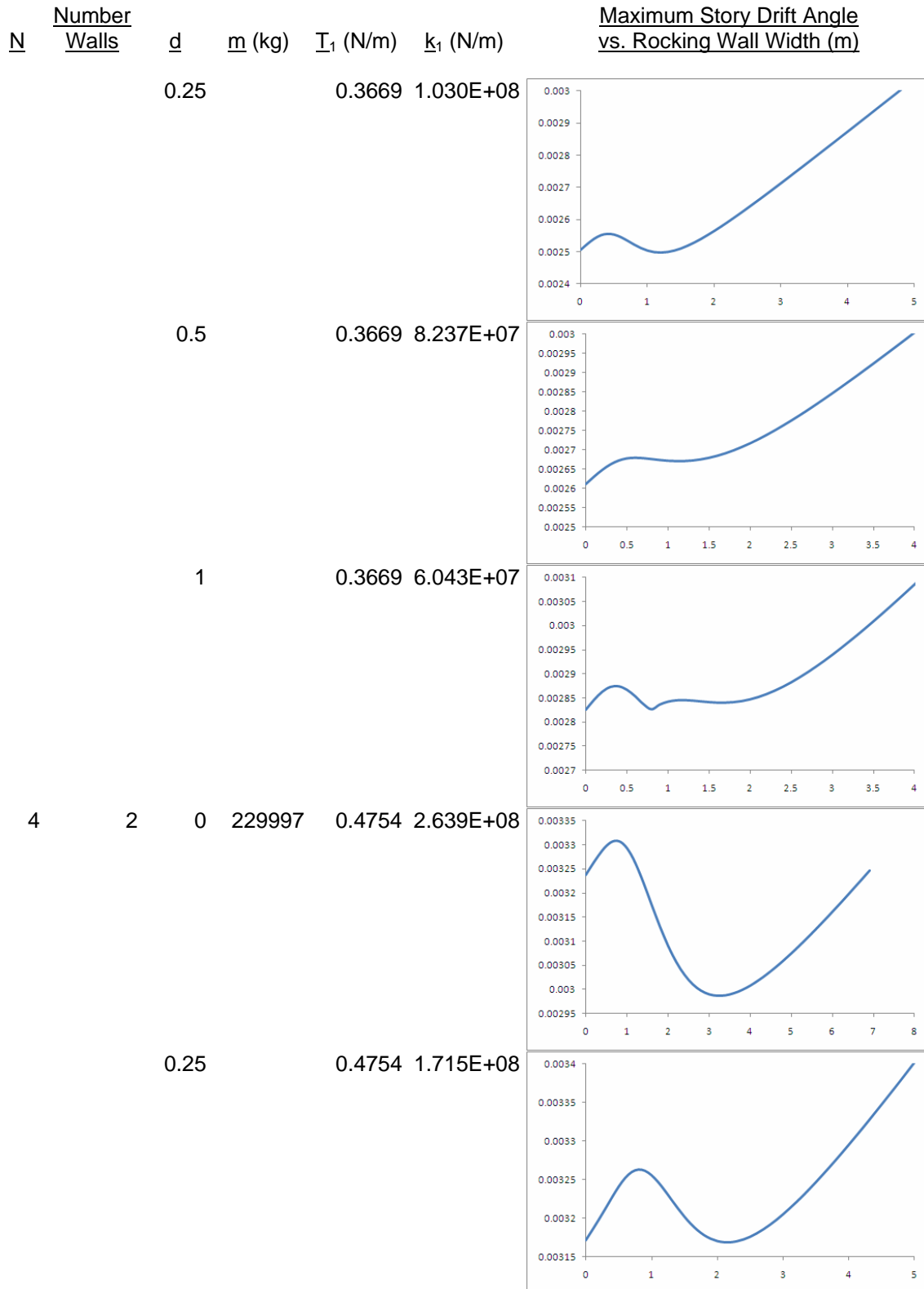


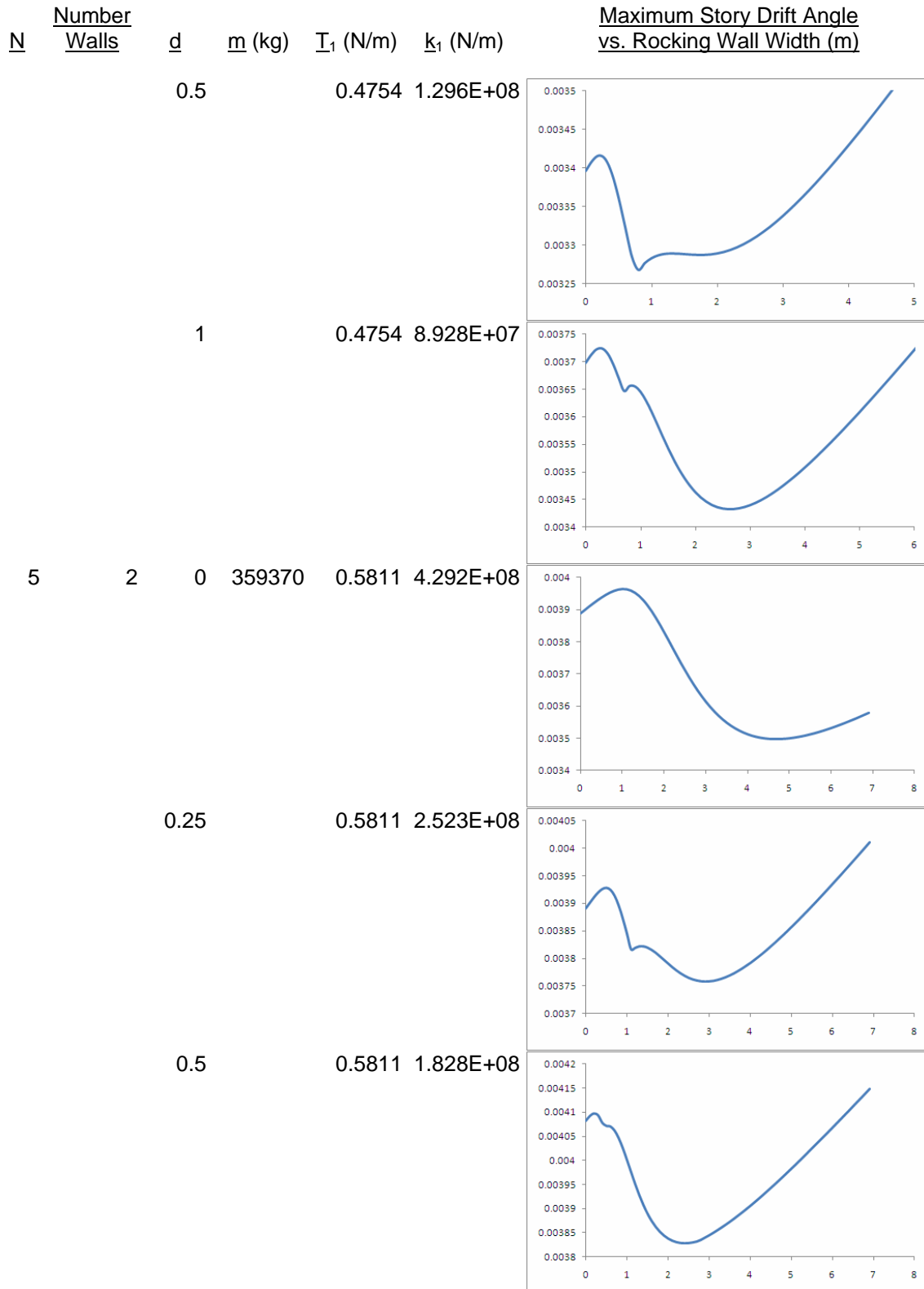
		1		0.2547	3.498E+07
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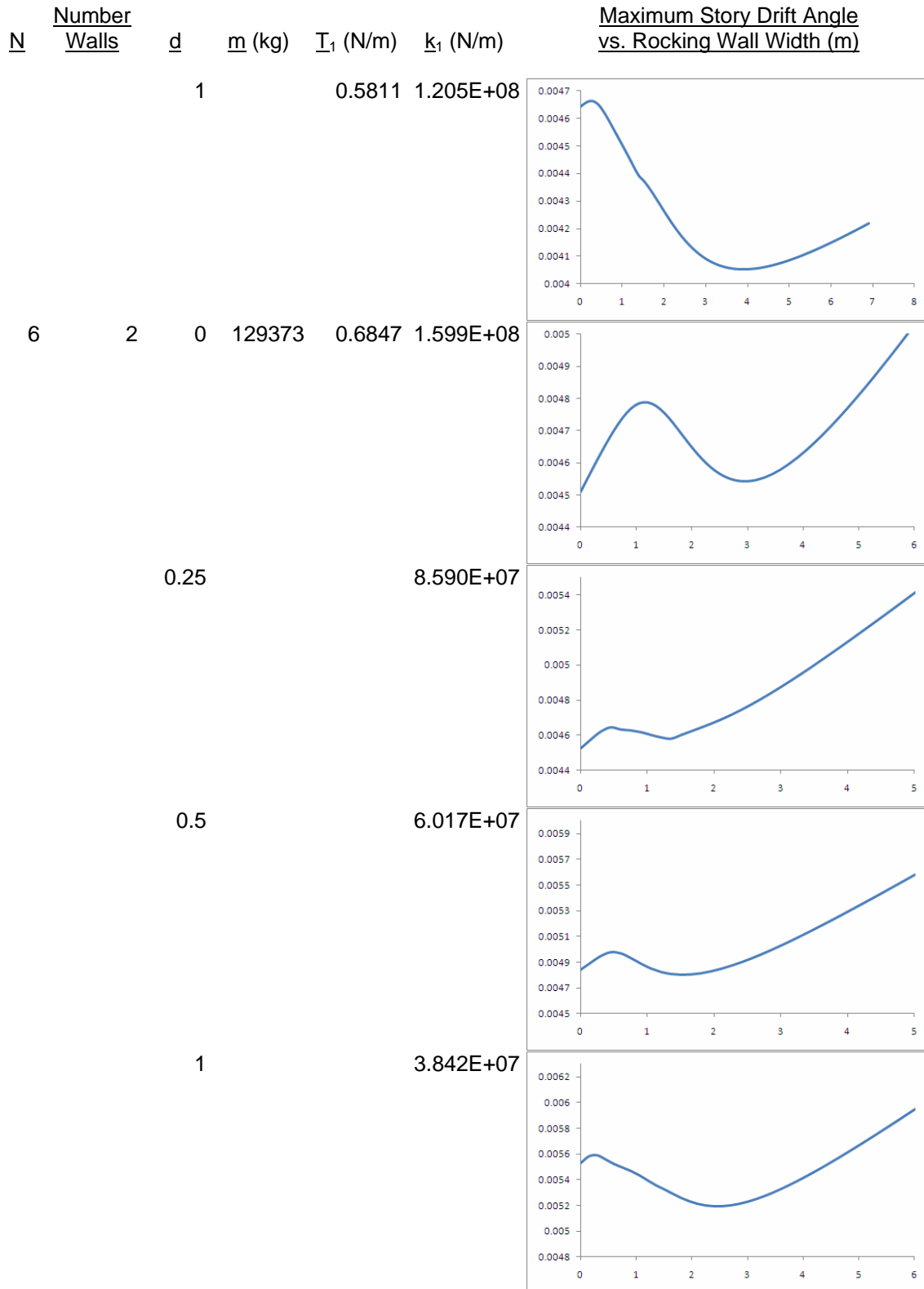


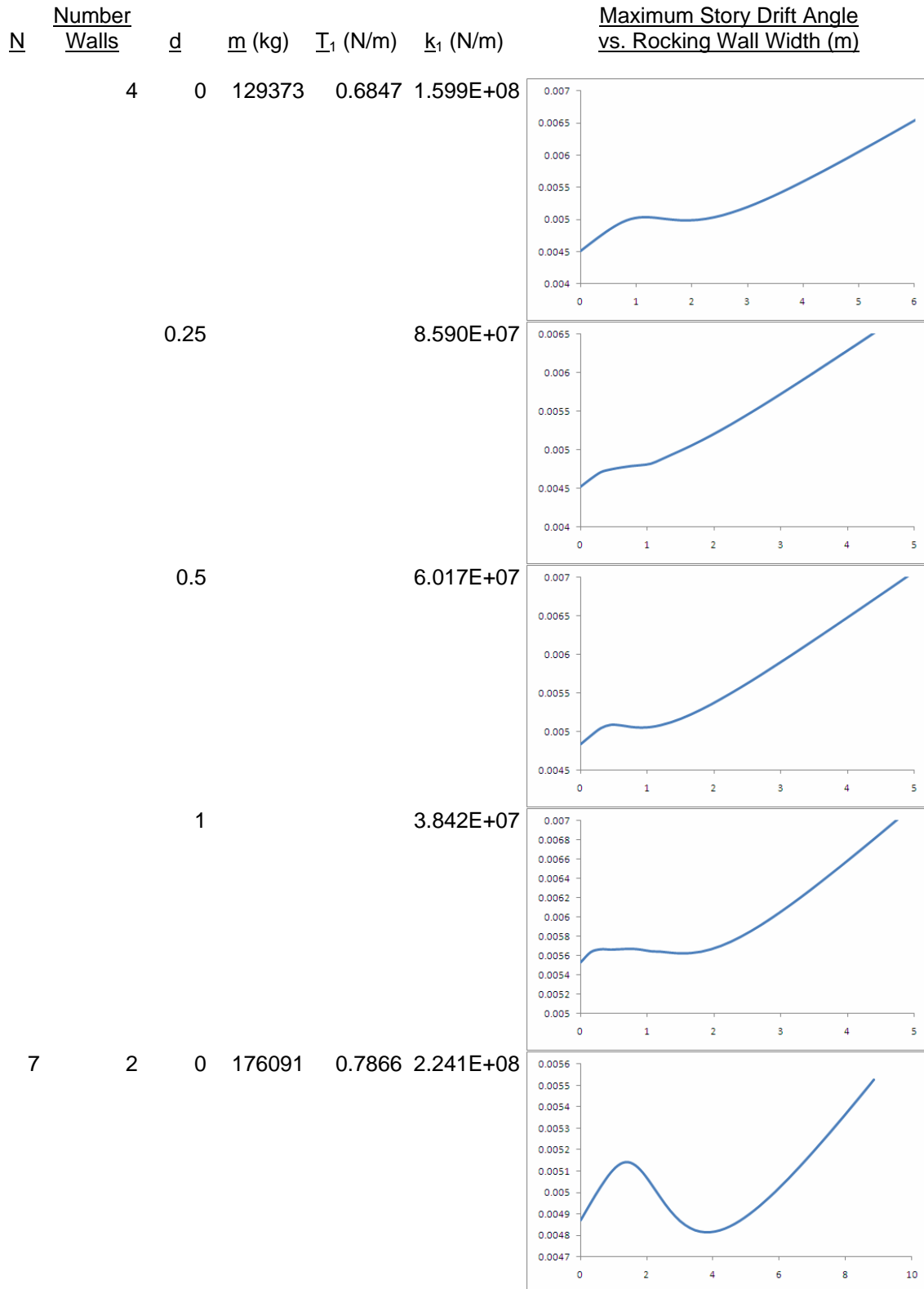
3	2	0	129373	0.3669	1.416E+08
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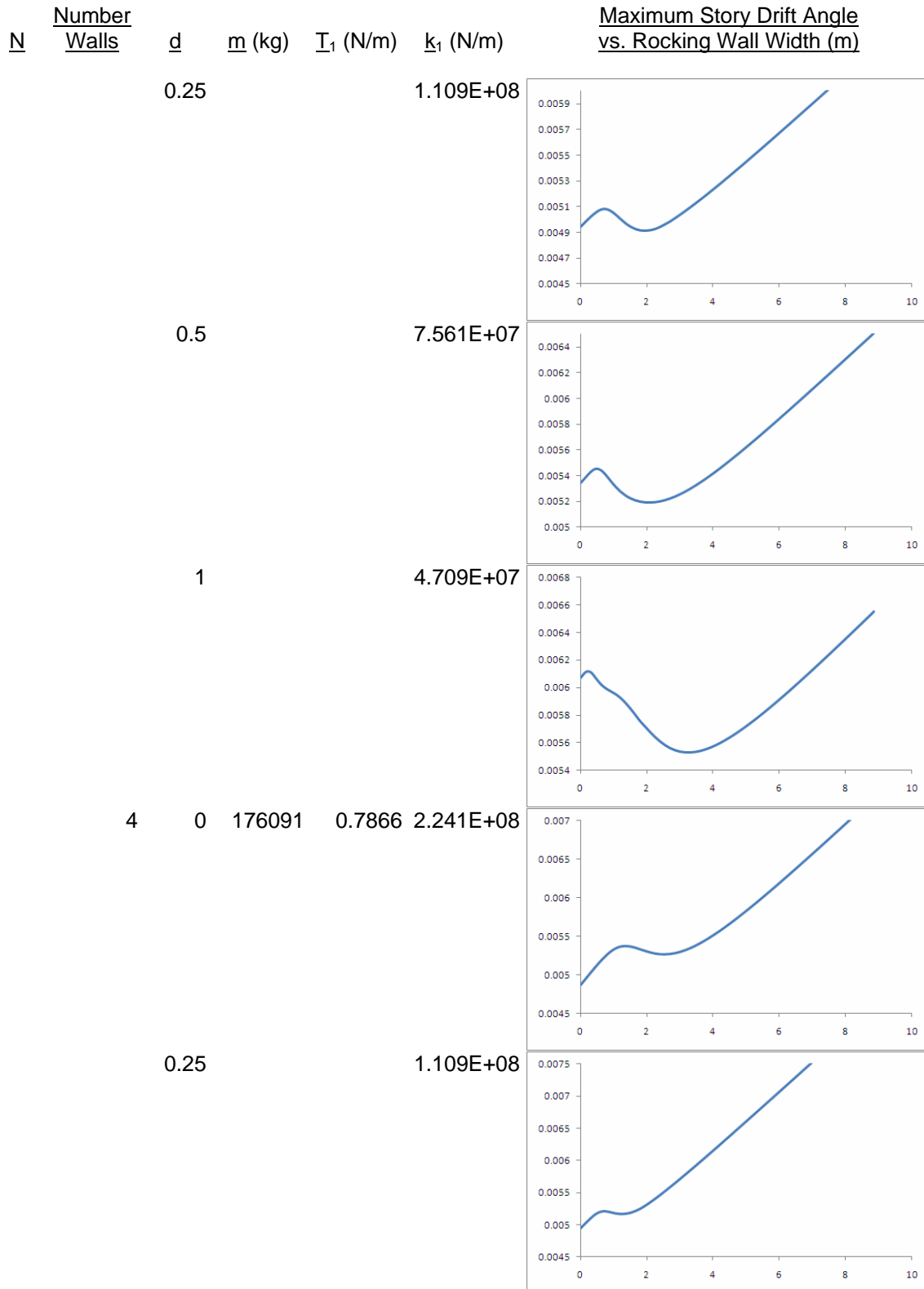


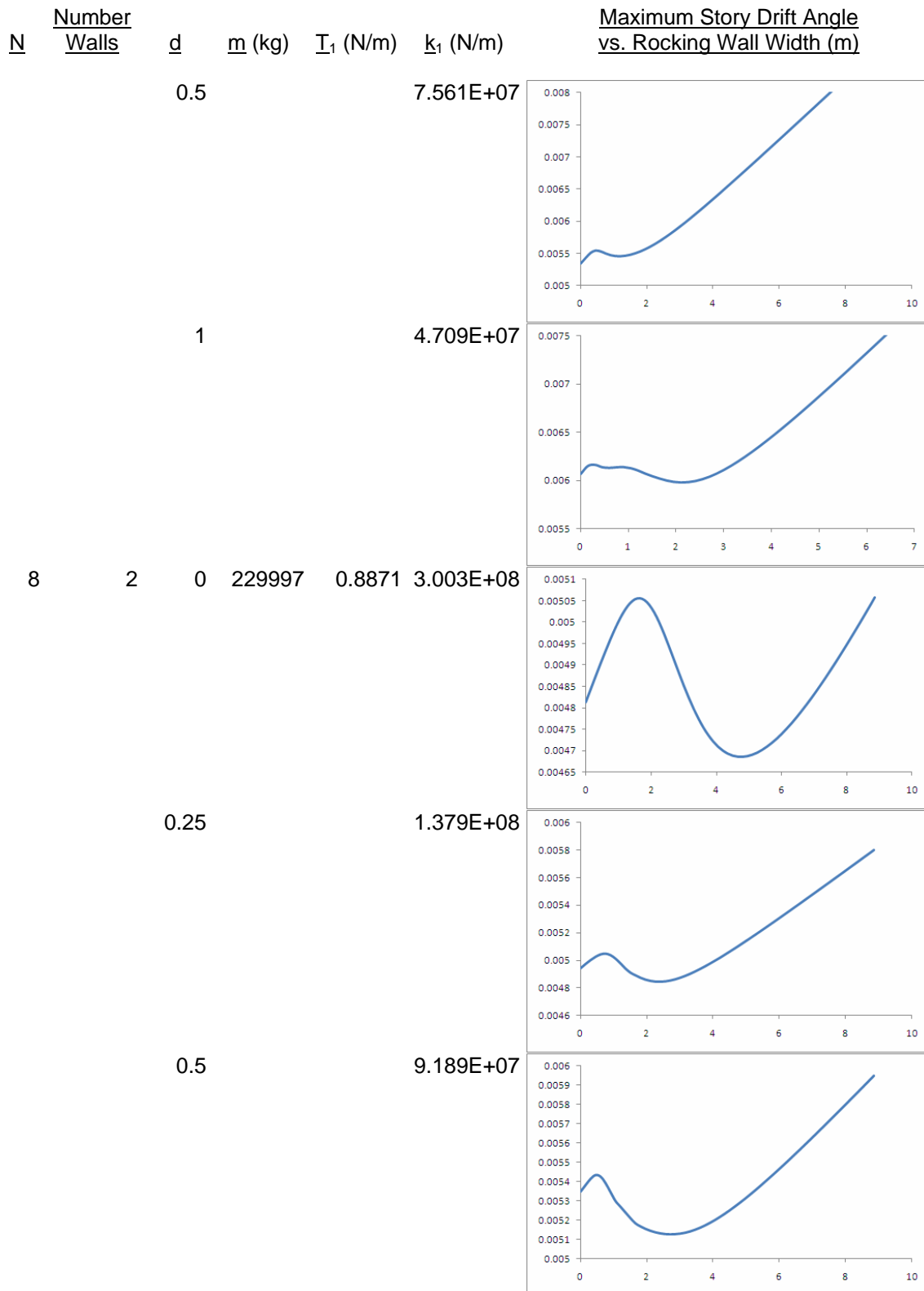


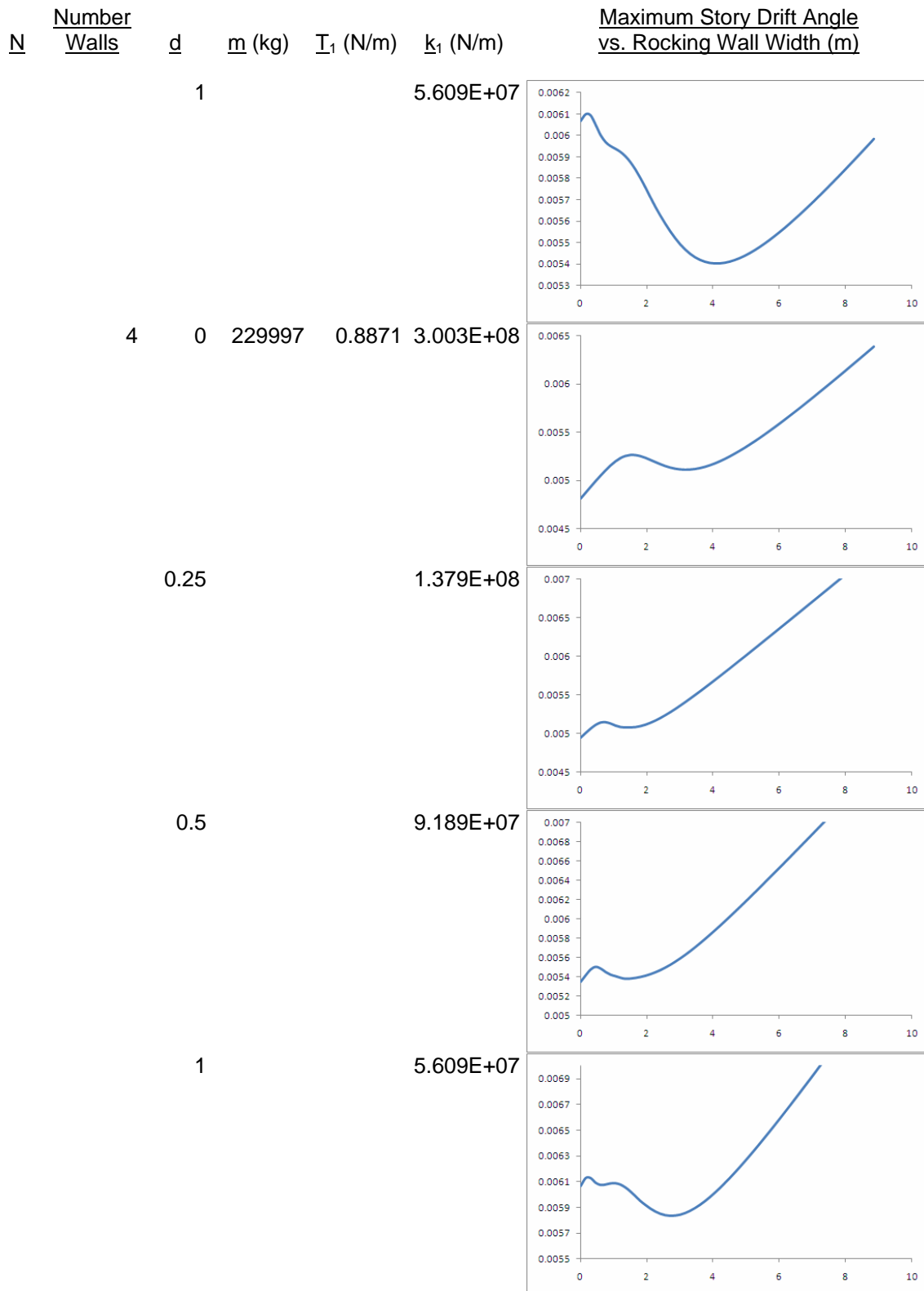








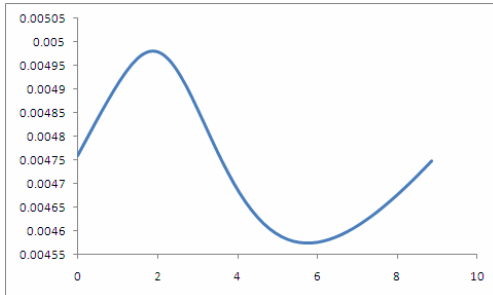




<u>N</u>	<u>Number Walls</u>	<u>d</u>	<u>m</u> (kg)	<u>I₁</u> (N/m)	<u>k₁</u> (N/m)
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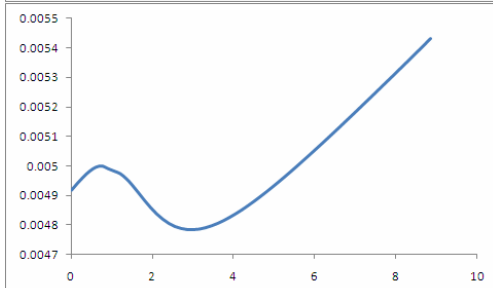
Maximum Story Drift Angle vs. Rocking Wall Width (m)

9	2	0	291090	0.9863	3.888E+08
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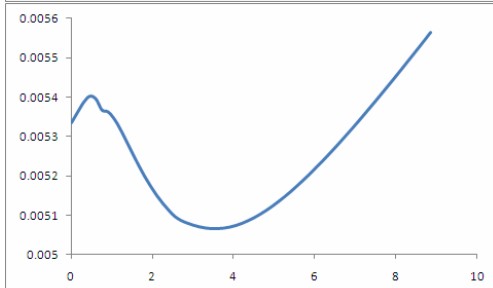
0.25

1.666E+08



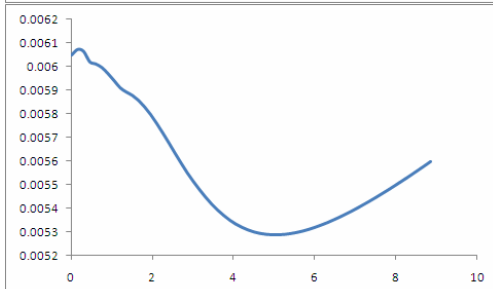
0.5

1.089E+08



1

6.538E+07



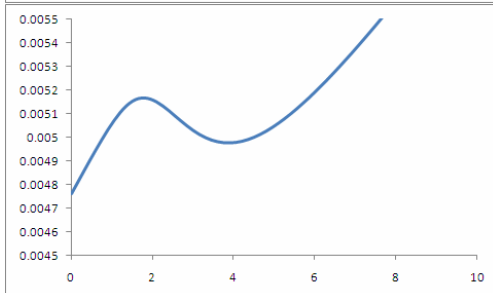
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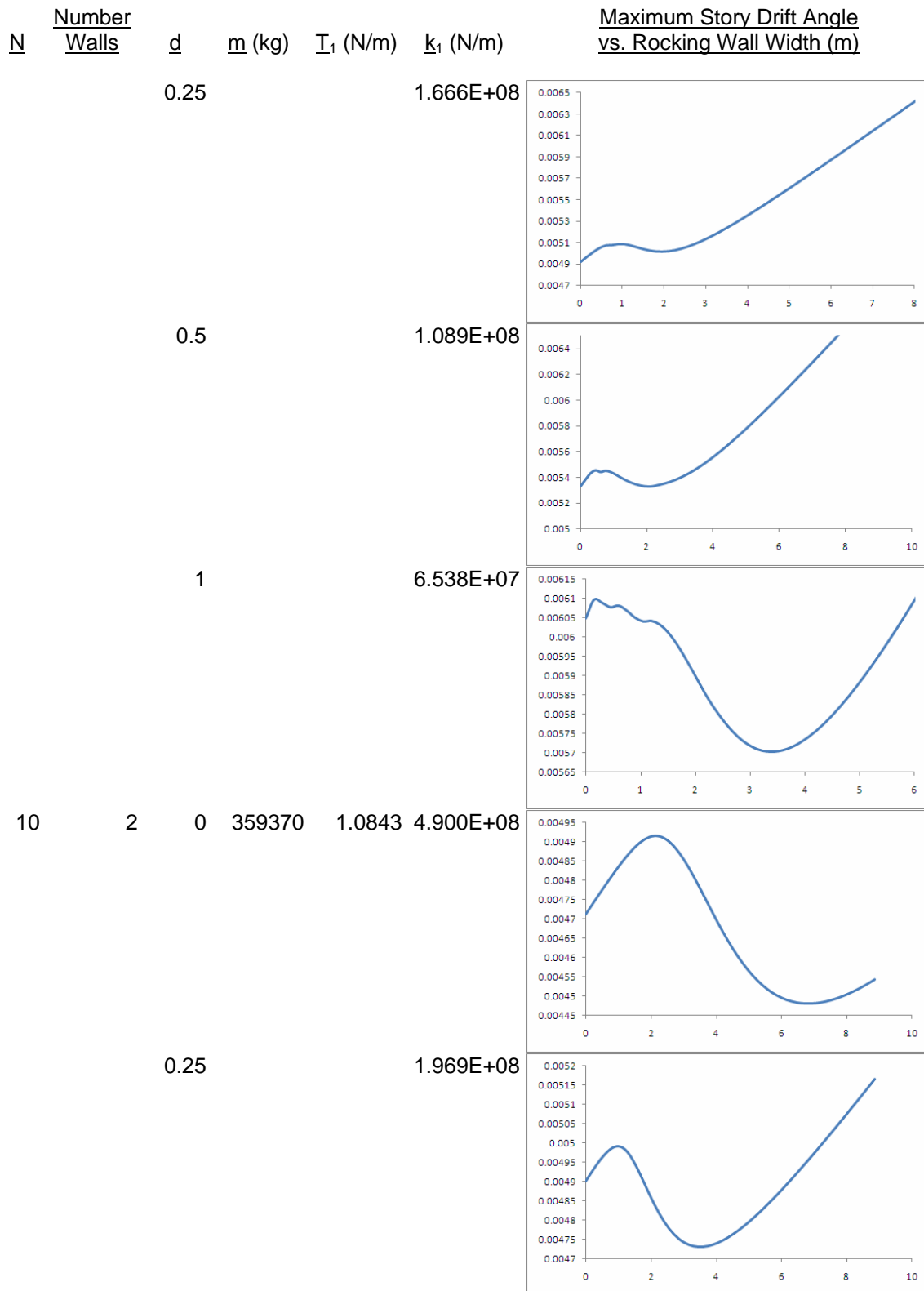
0

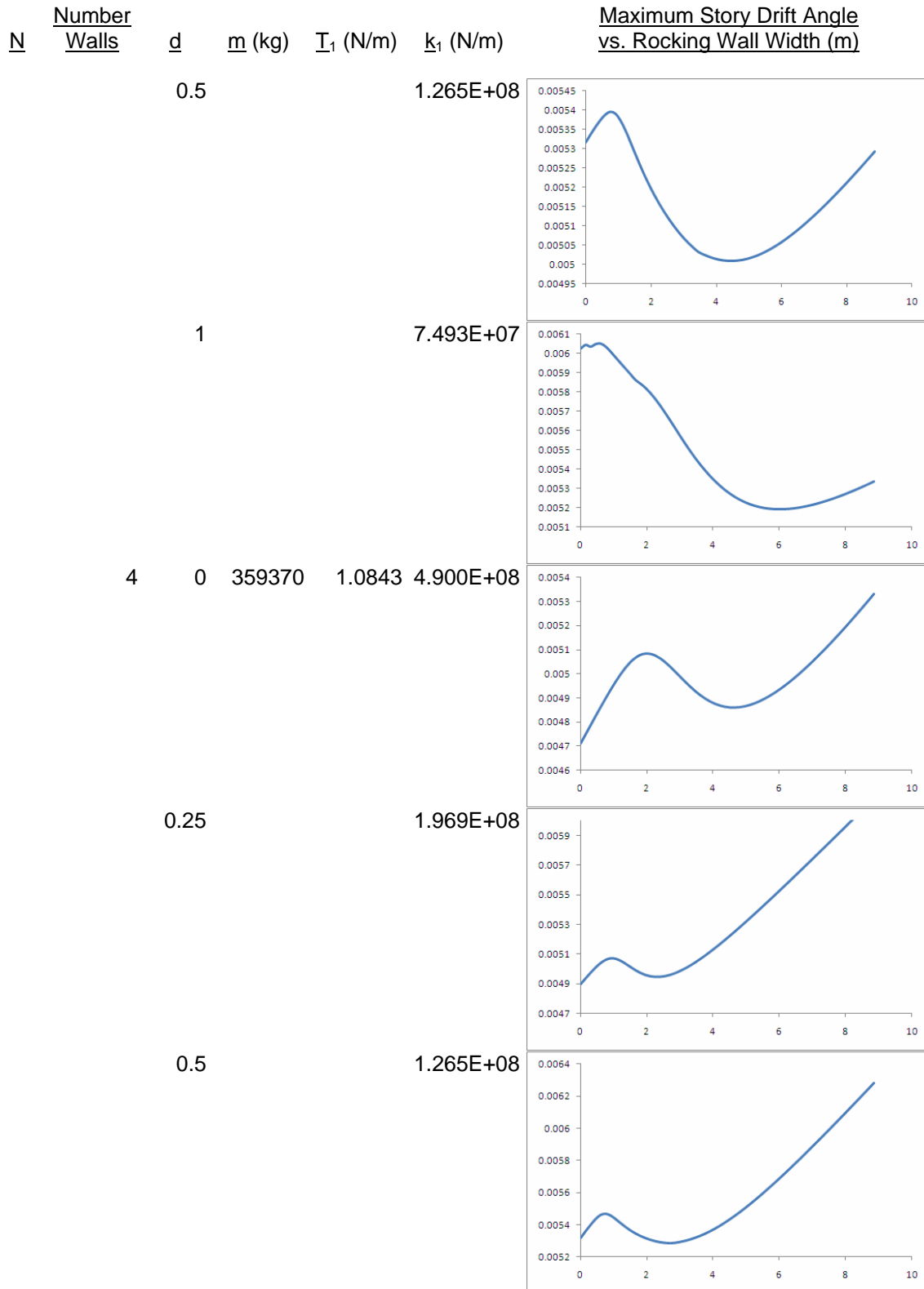
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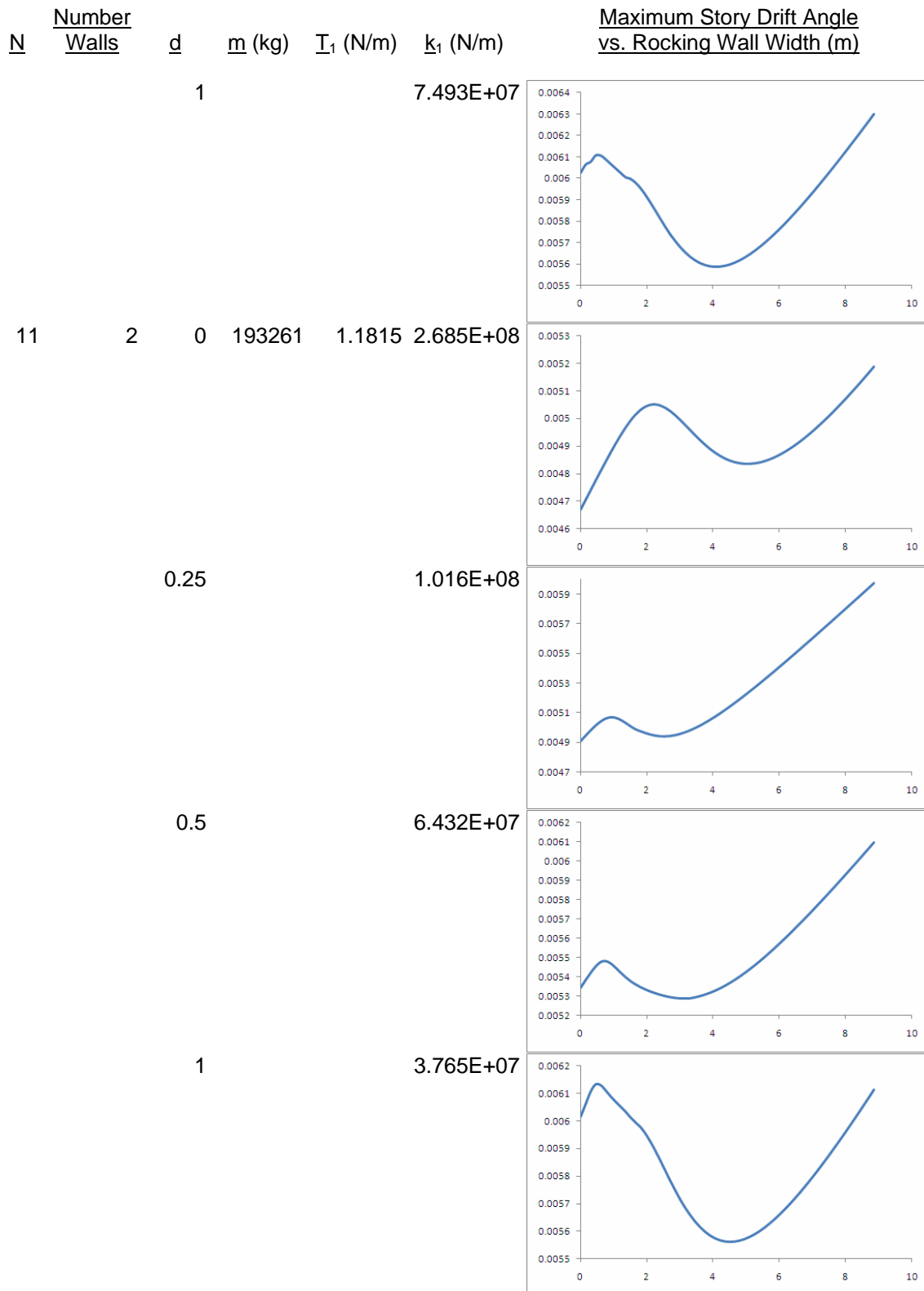
0.9863

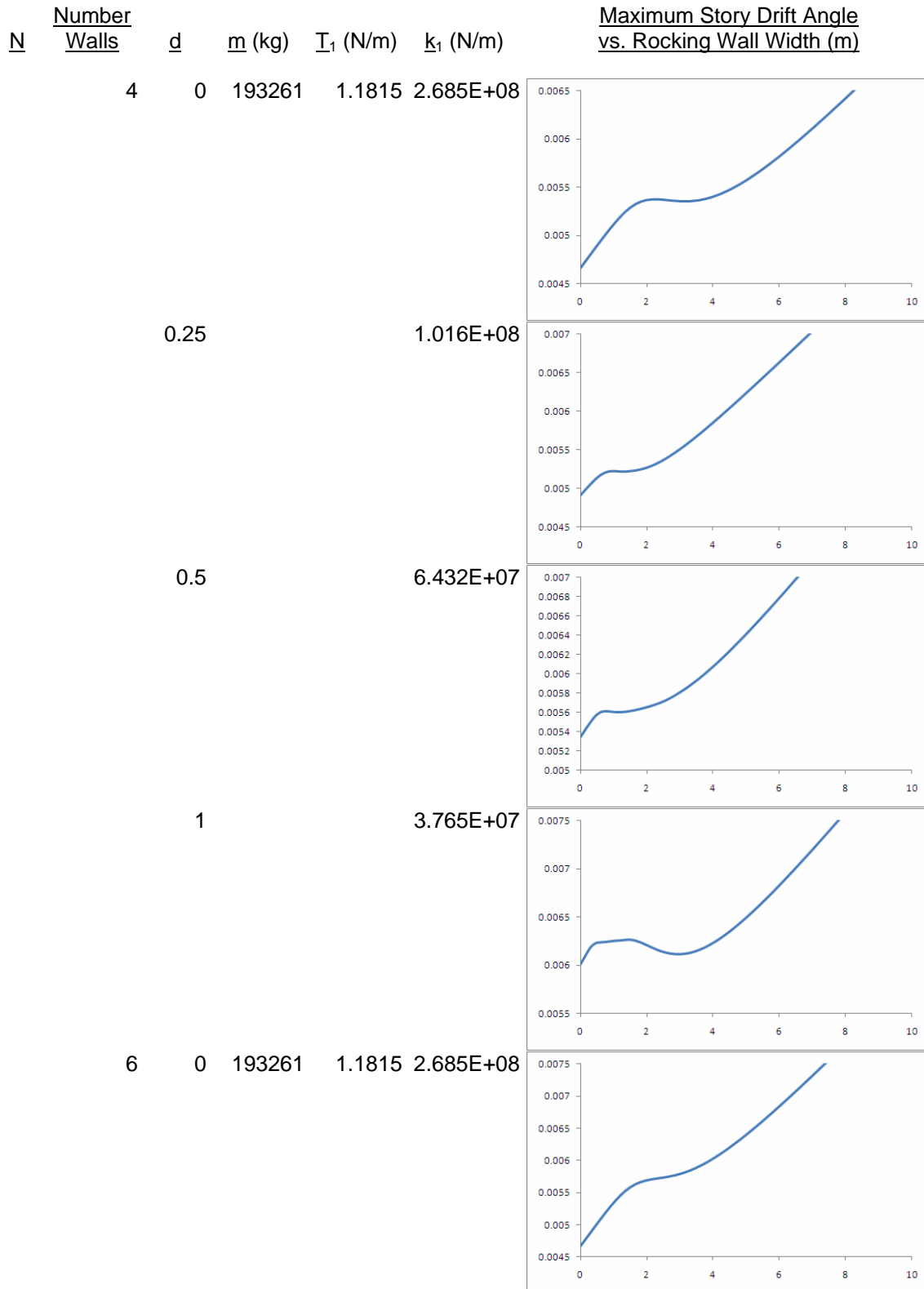
3.888E+08

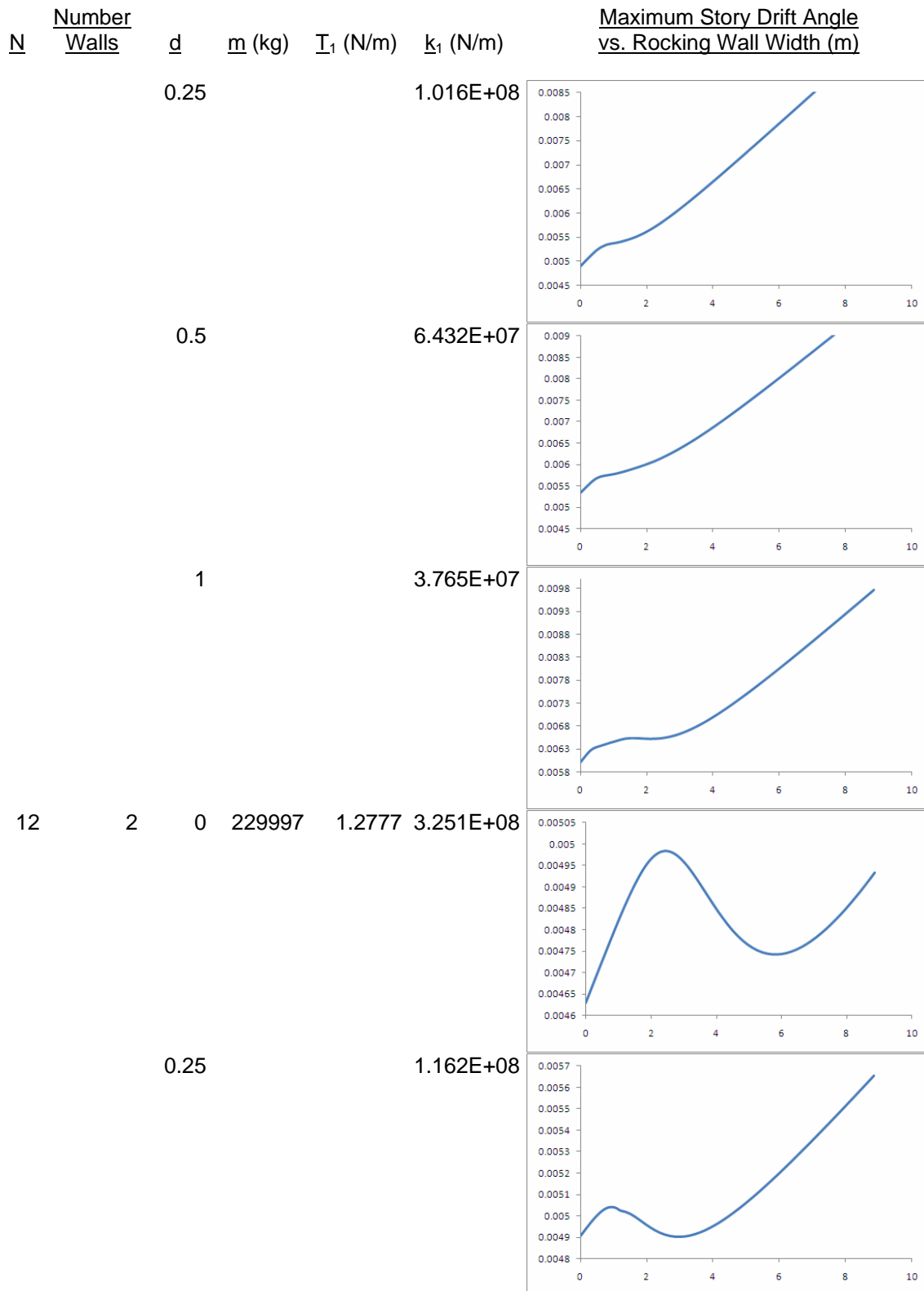


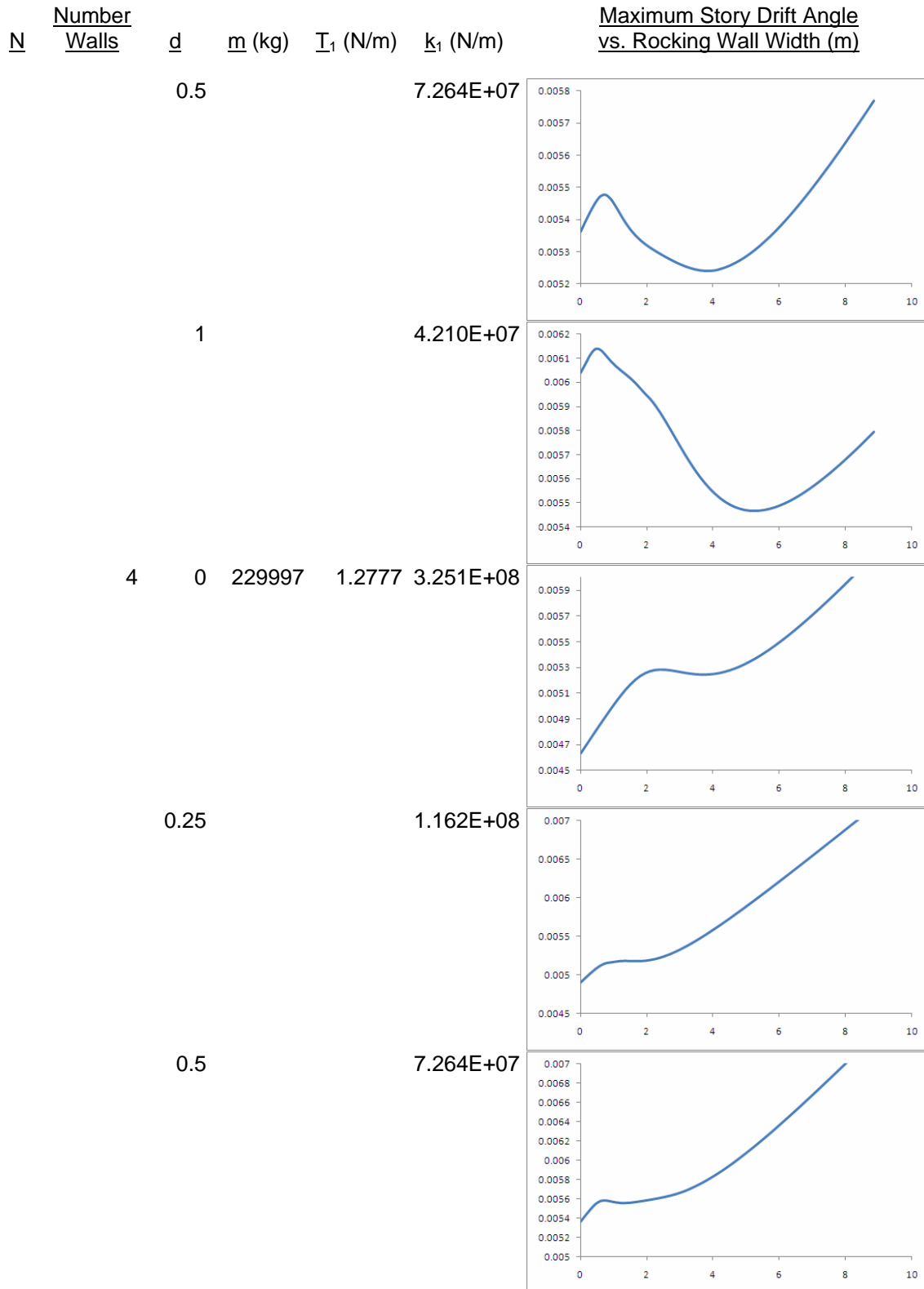


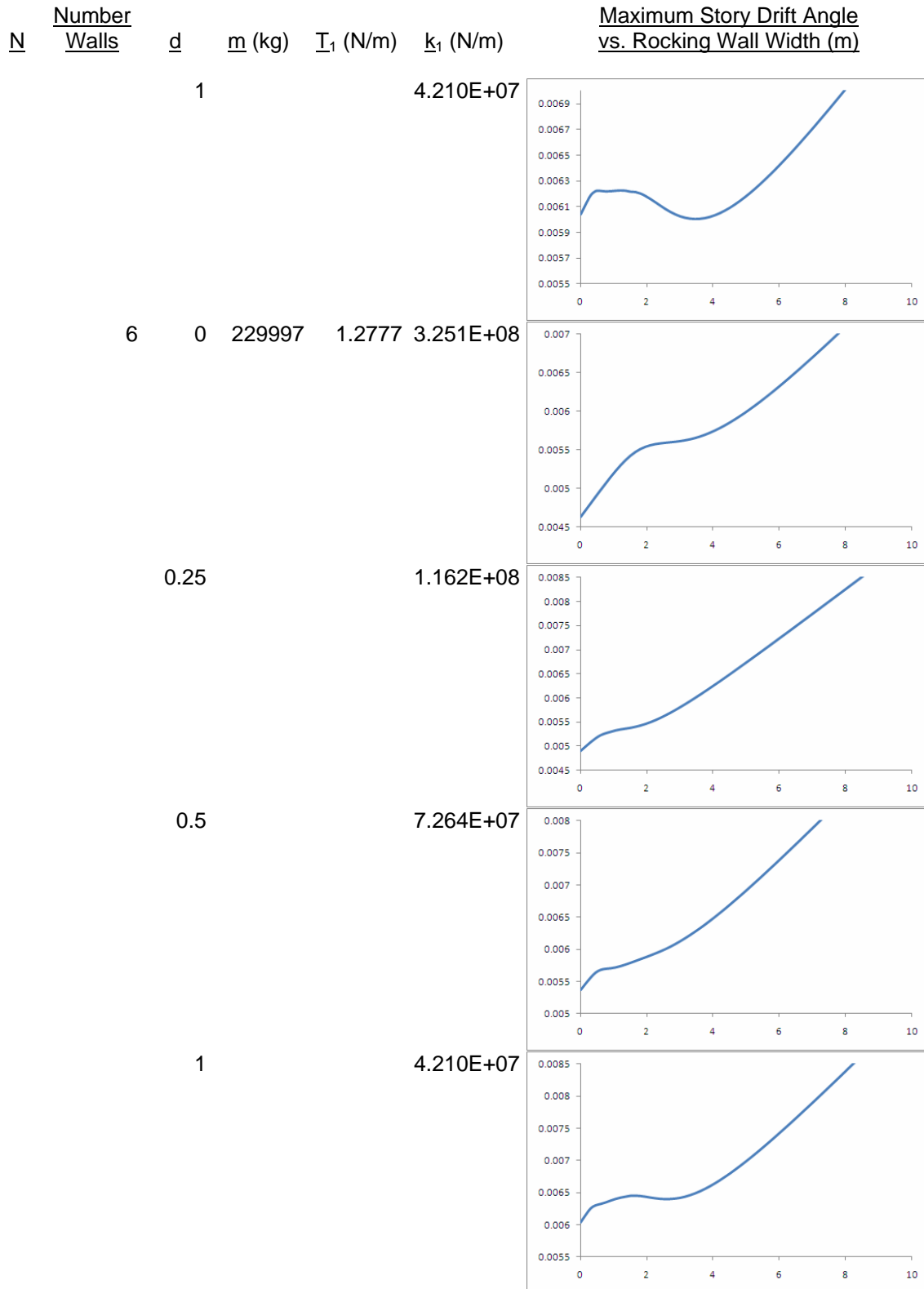








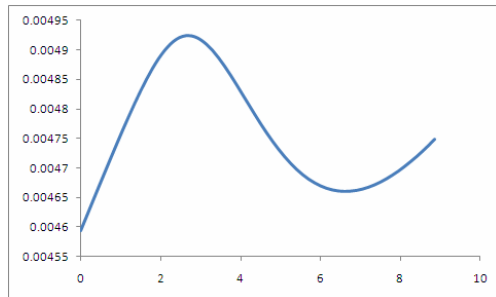




N Number
Walls d m (kg) I₁ (N/m) k₁ (N/m)

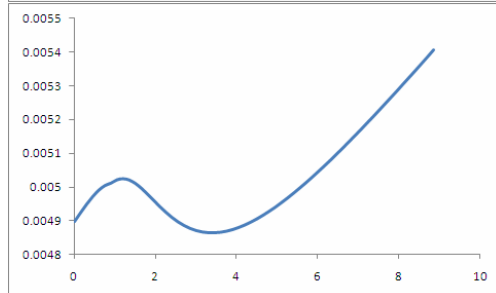
Maximum Story Drift Angle
vs. Rocking Wall Width (m)

13 2 0 269927 1.3732 3.876E+08



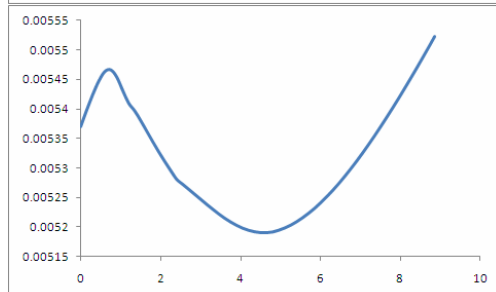
0.25

1.313E+08



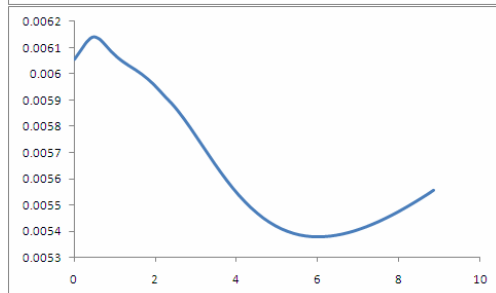
0.5

8.116E+07

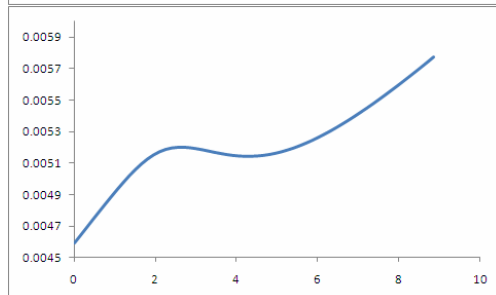


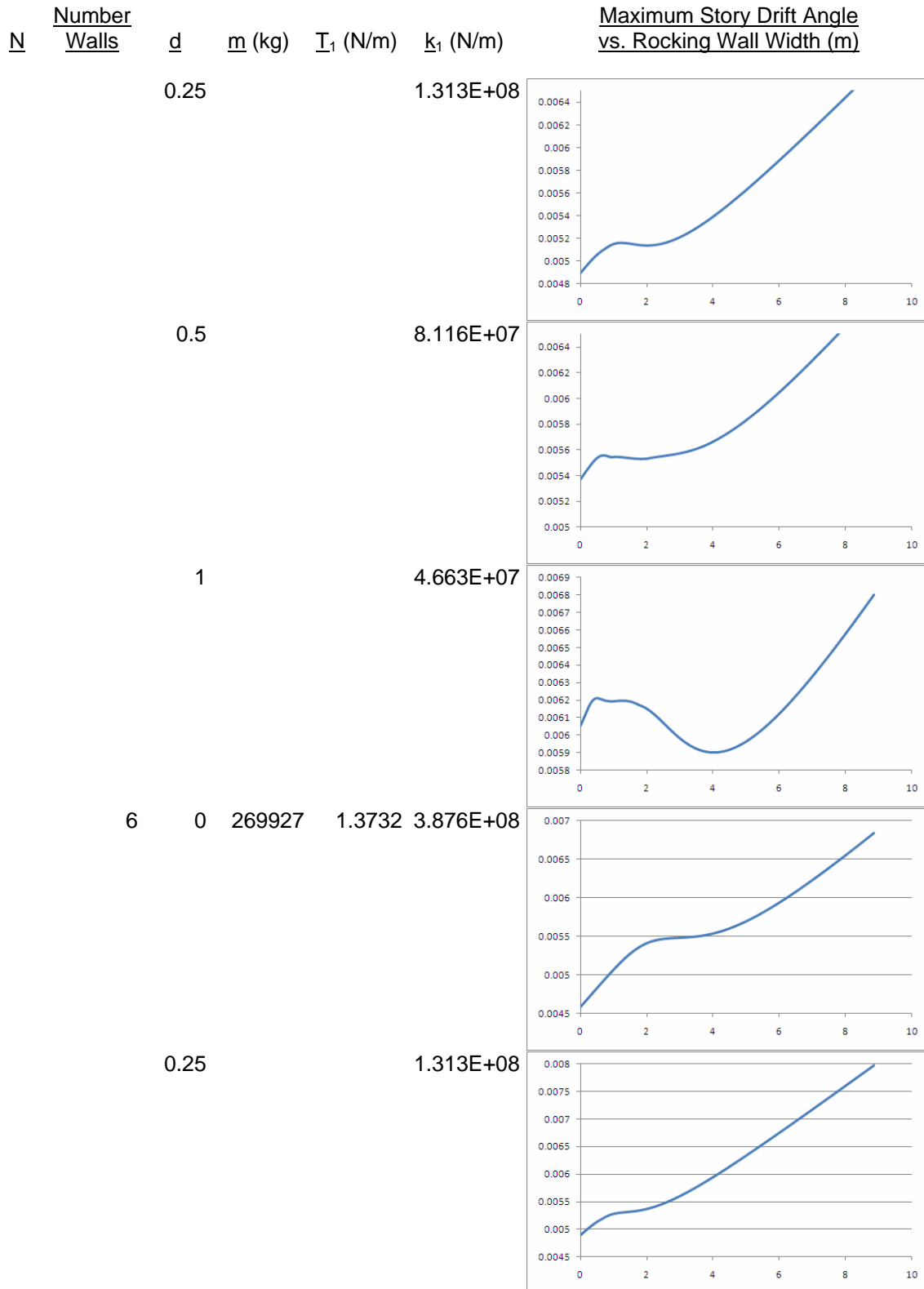
1

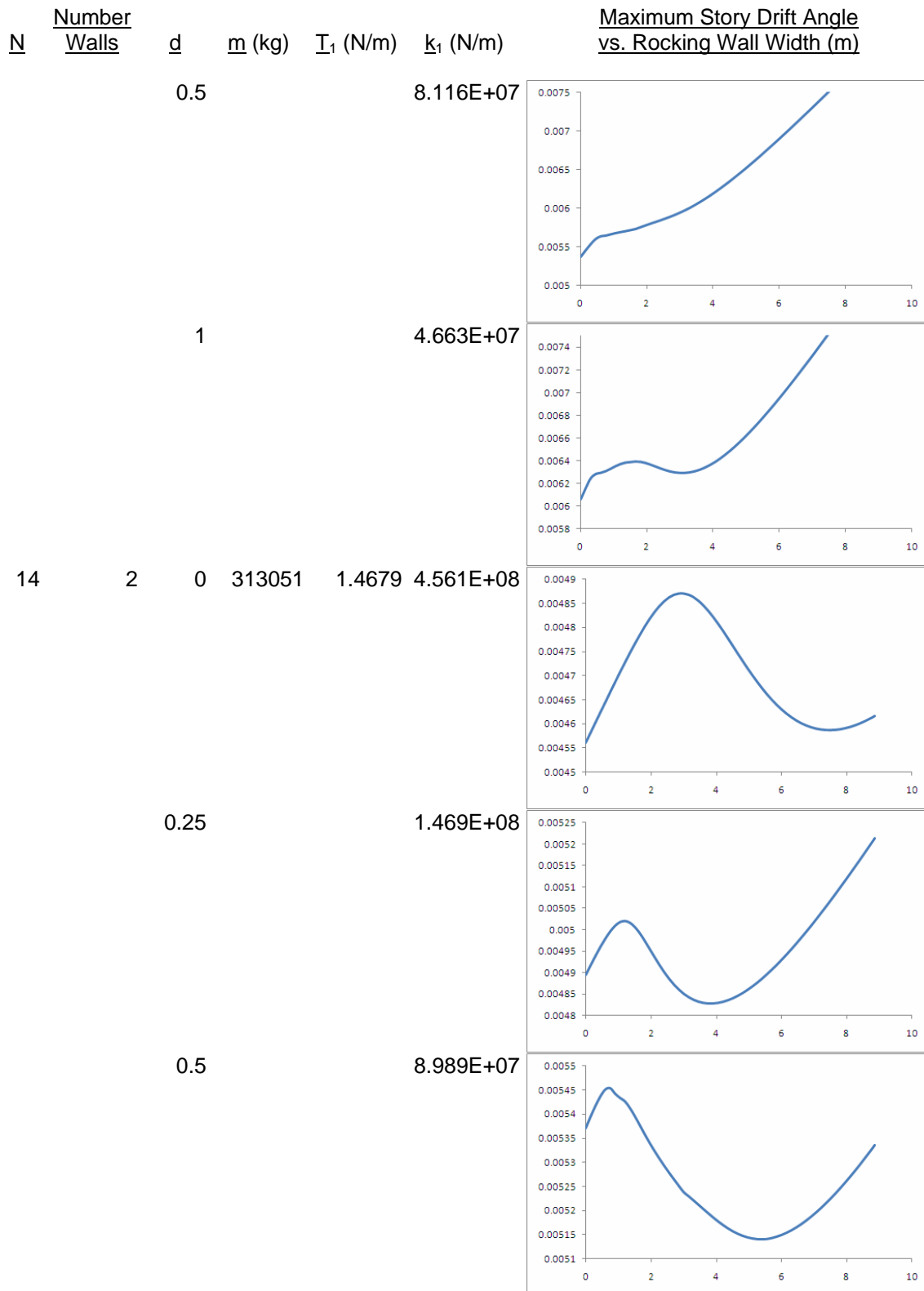
4.663E+07

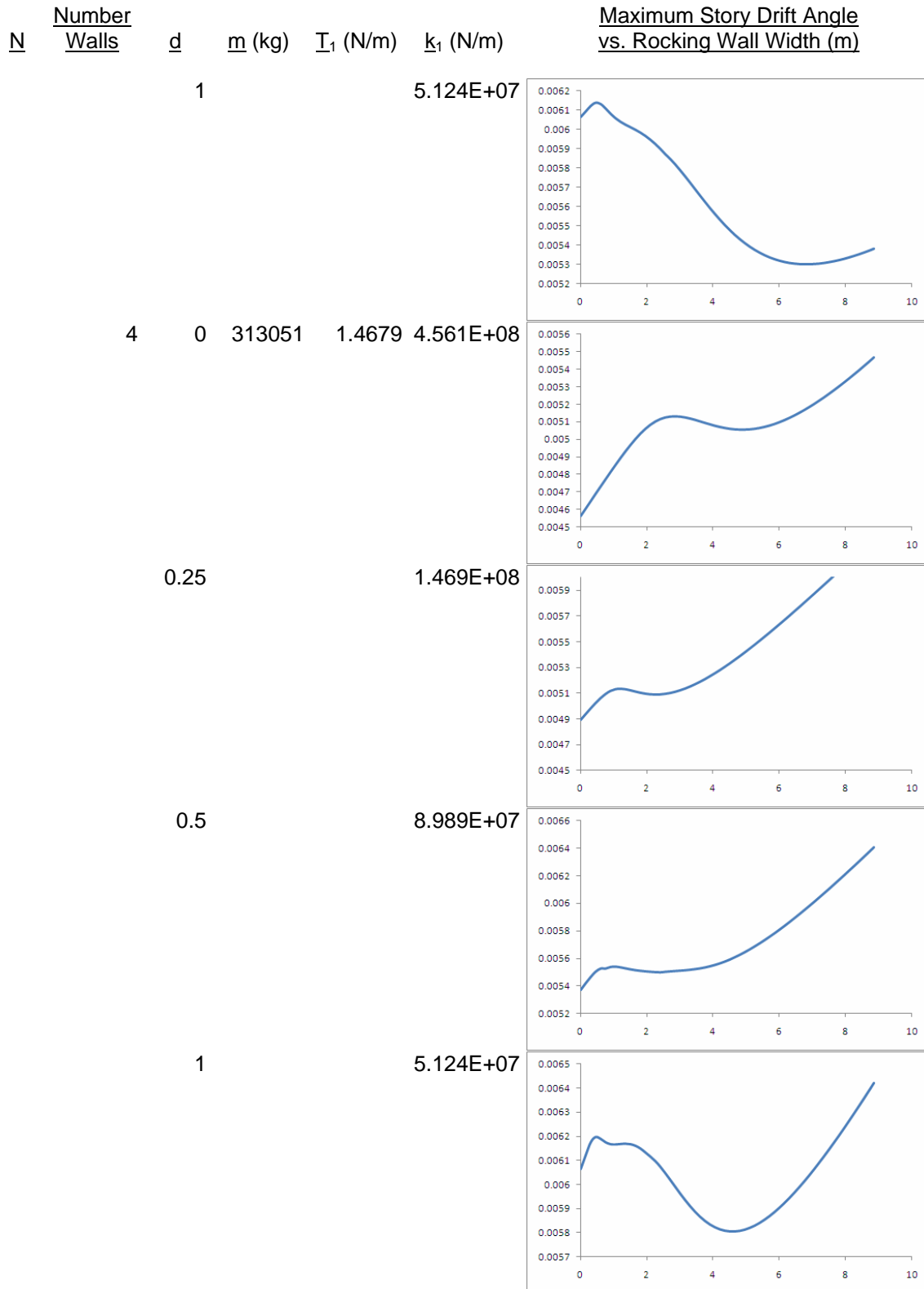


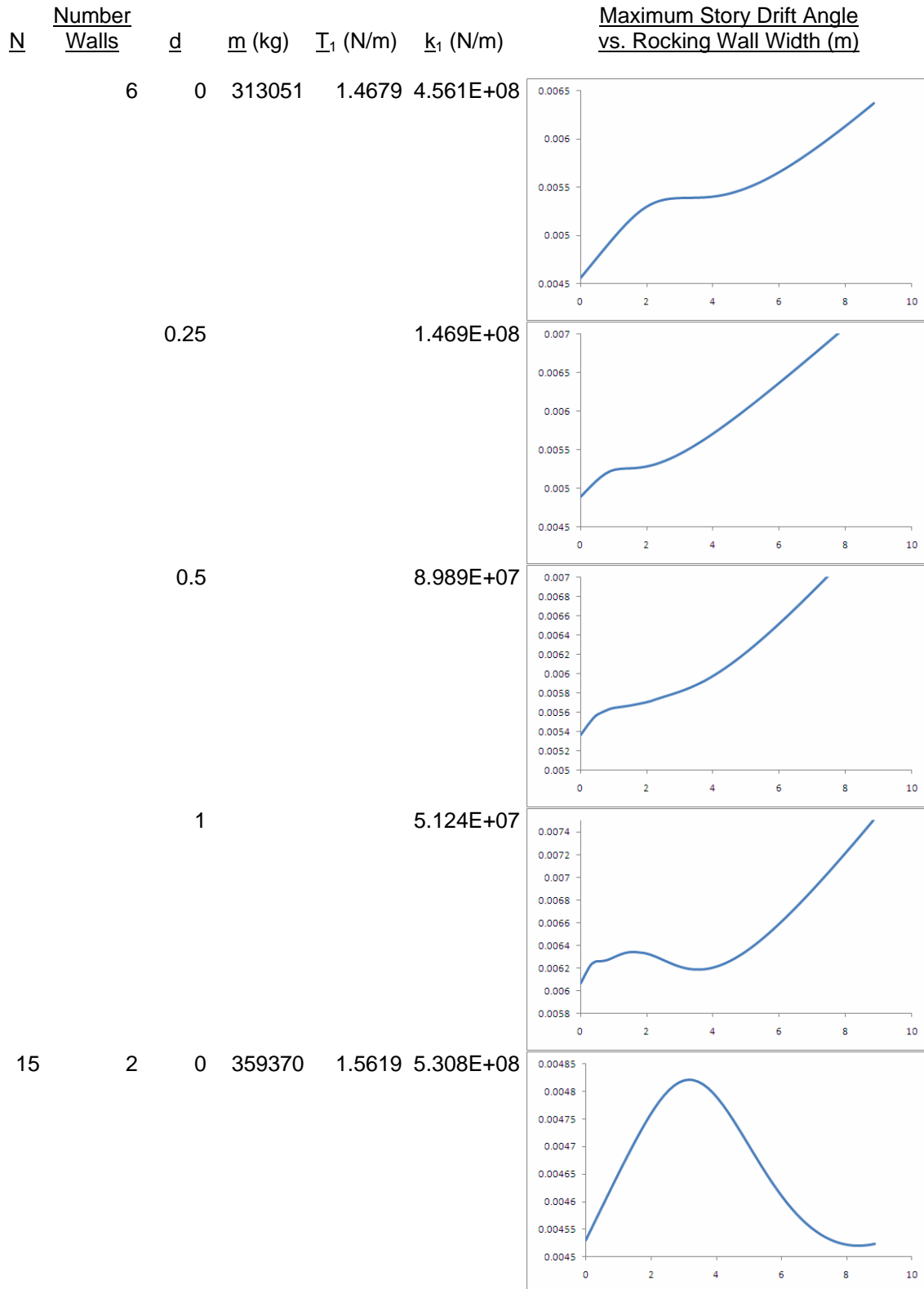
4 0 269927 1.3732 3.876E+08

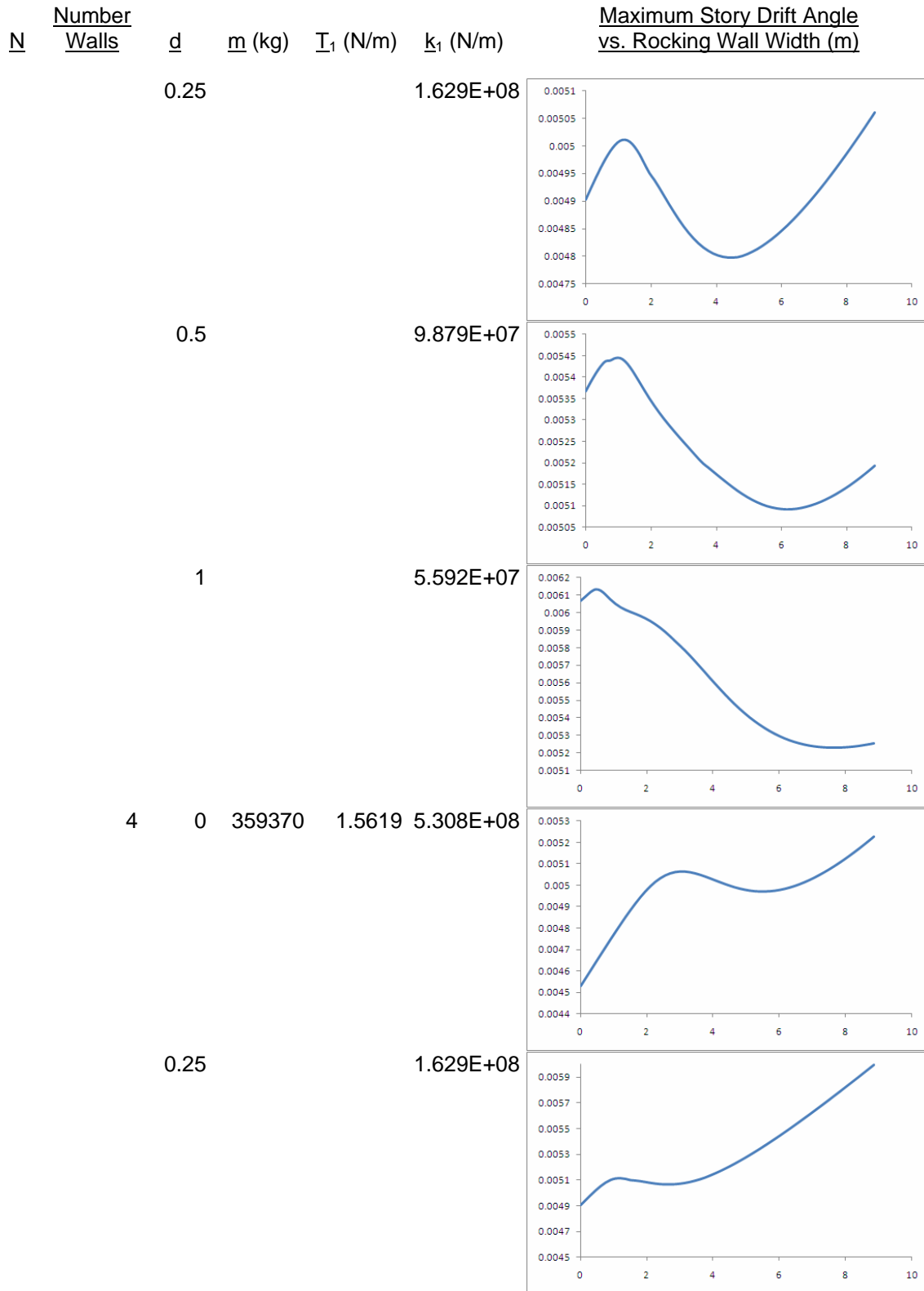


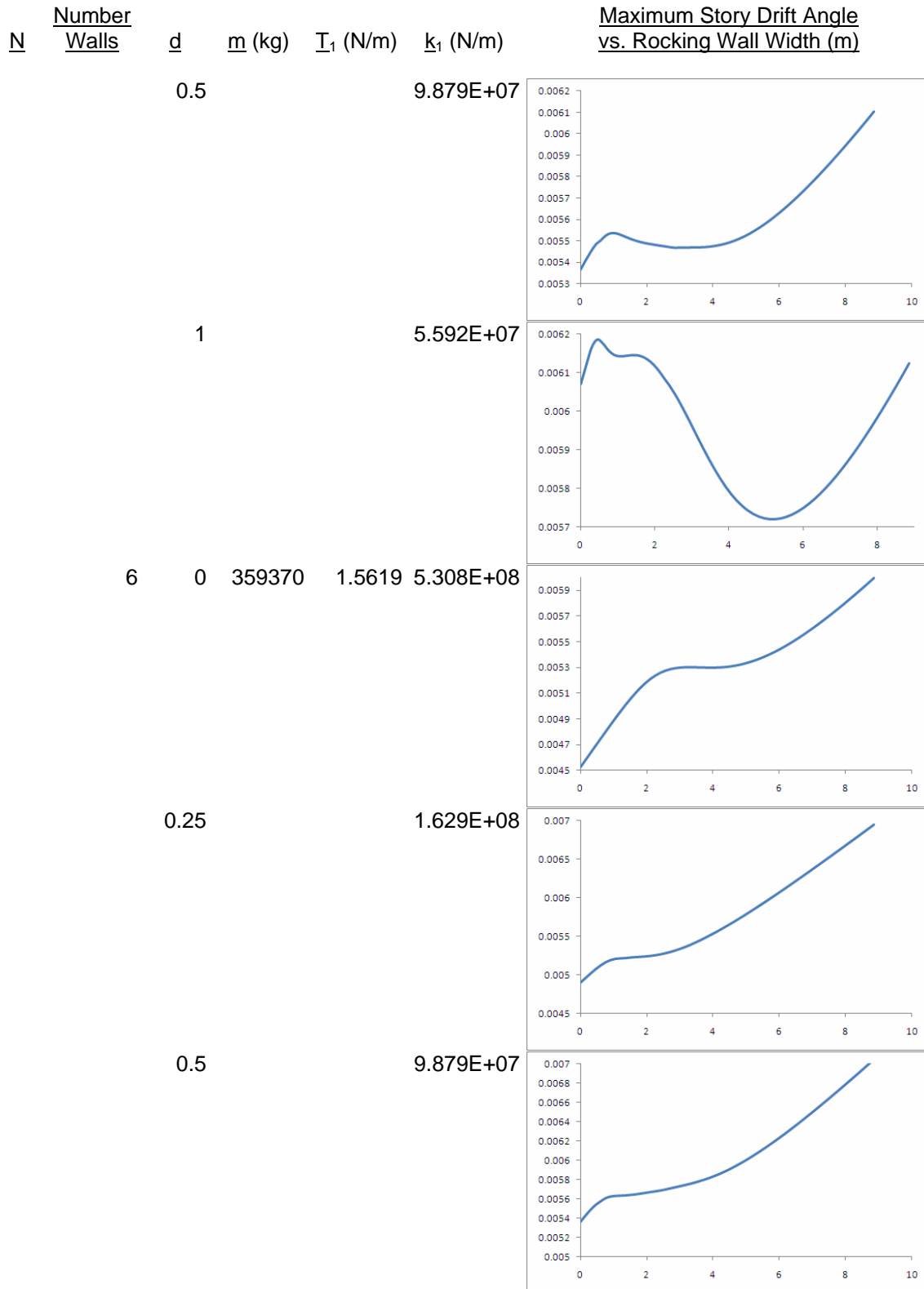












<u>N</u>	<u>Number Walls</u>	<u>d</u>	<u>m (kg)</u>	<u>I₁ (N/m)</u>	<u>k₁ (N/m)</u>
		1			5.592E+07

Maximum Story Drift Angle vs. Rocking Wall Width (m)

