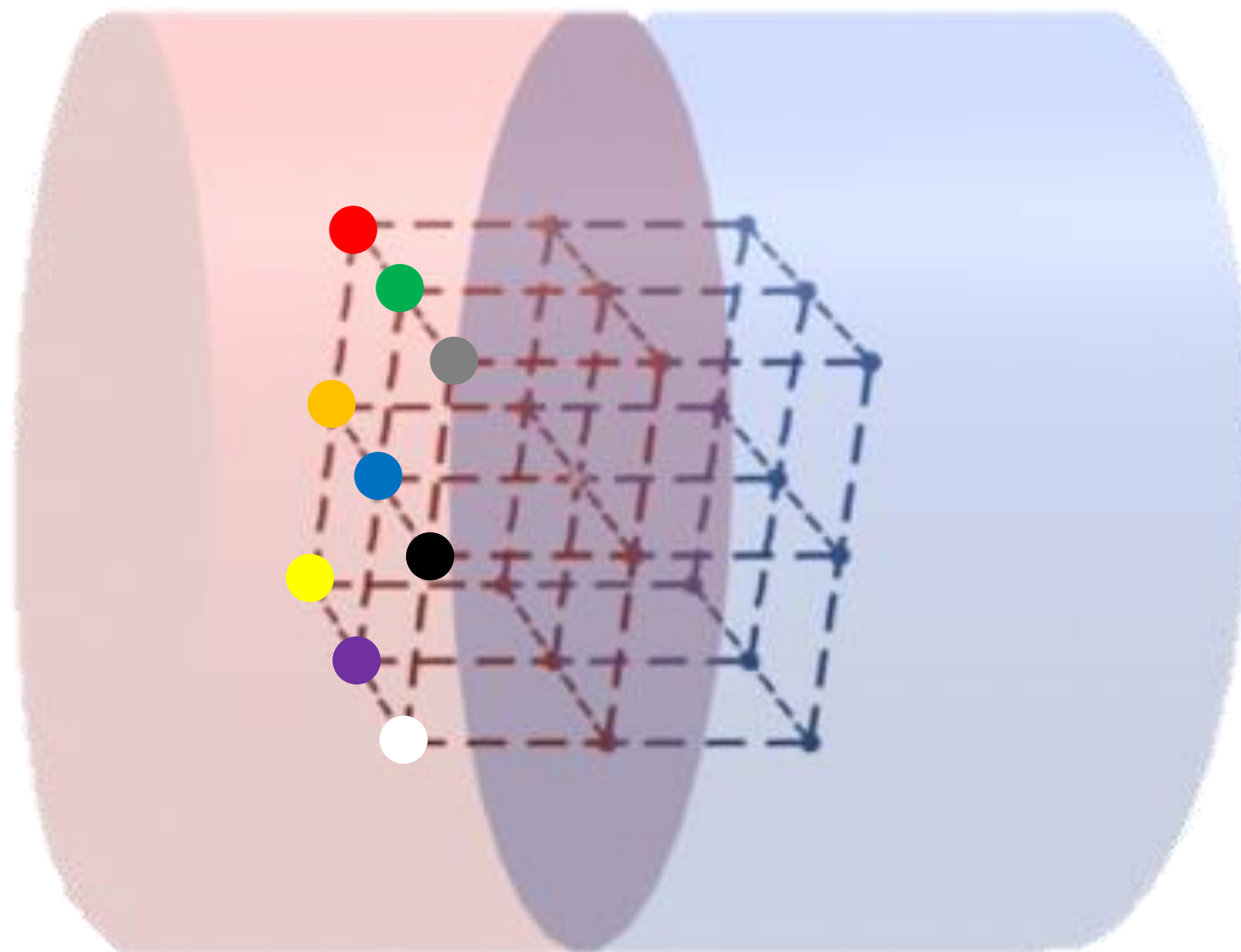


Parametric sweeps

TI Precision Labs – TI Magnetic Sense Simulator (TIMSS)

Presented and prepared by Isaac Lara

What are parametric sweeps?



- (0,0,0)
- (0,1,0)
- (0,2,0)
- (1,0,0)
- (1,1,0)
- (1,2,0)
- (2,0,0)
- (2,1,0)
- (2,2,0)
- (X,Y,Z)

Parametric sweep options

Untitled * Parameter 1 Action Rotation Save

Design Sweep Input Sweep Output



Parameter 1

Parameter: Sensor 1 : TMAG5110-Q1 - Sensor position - X

Sweep Type: Range

Parameter 1

Sweep Type: Temperature

Temperature Coefficient

From: 6.05 To: 7 Step size: 0.15

Preview: 6.05, 6.2, 6.35, 6.5, 6.65, 6.8, 6.95



Parameter 1

Parameter: Sensor 1 : TMAG5110-Q1 - Sensor position - X

Sweep Type: Discrete

Parameter 1

Sweep Type: Magnet Angle - Z

Poles

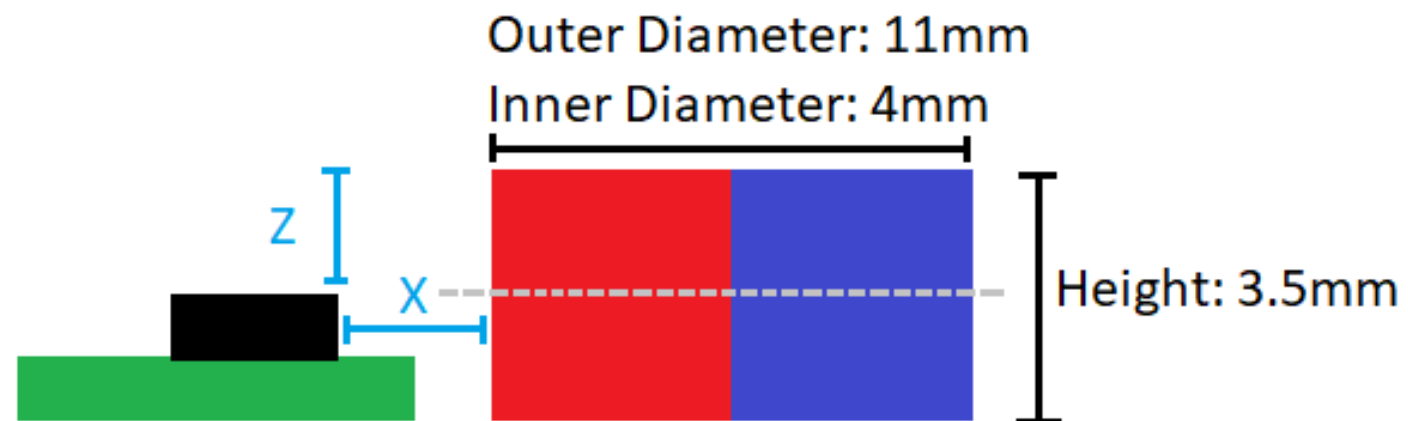
Values: 6.05, 6.22, 6.33 (require comma separated values)

Preview: 6.05, 6.22, 6.33

- Sensor 1 : TMAG5110-Q1 - Sensor Angle - X
- Sensor 1 : TMAG5110-Q1 - Sensor Angle - Y
- Sensor 1 : TMAG5110-Q1 - Sensor Angle - Z

Simulate

Simulation configuration example

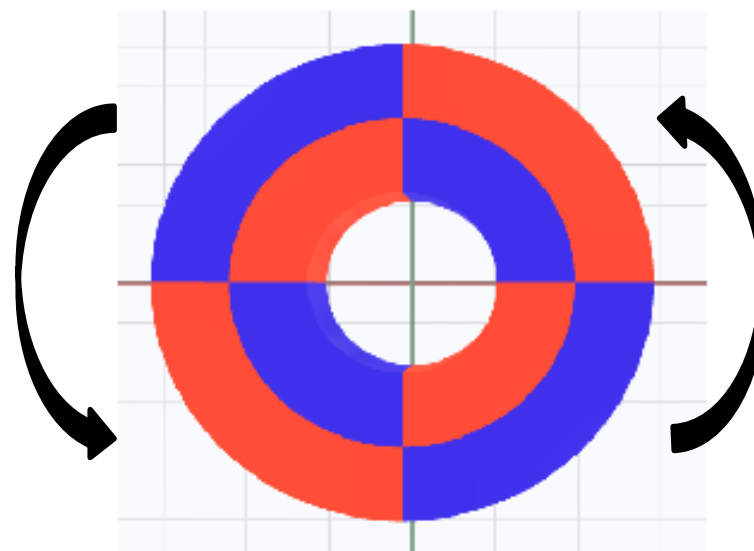


Sensor position:

- X- 6.05mm
- Y- 0mm
- Z- 0.25mm

Other magnet details:

- Magnet Shape- Ring
- Pole count- 4
- Degrees of rotation- 360°
- Material- AlNiCo
- Magnet grade-LN9



Simulation configuration walkthrough

TI Magnetic Sense Simulator (TIMSS) Isaac

1 Function & Magnet 2 Select Sensor 3 Preview Window

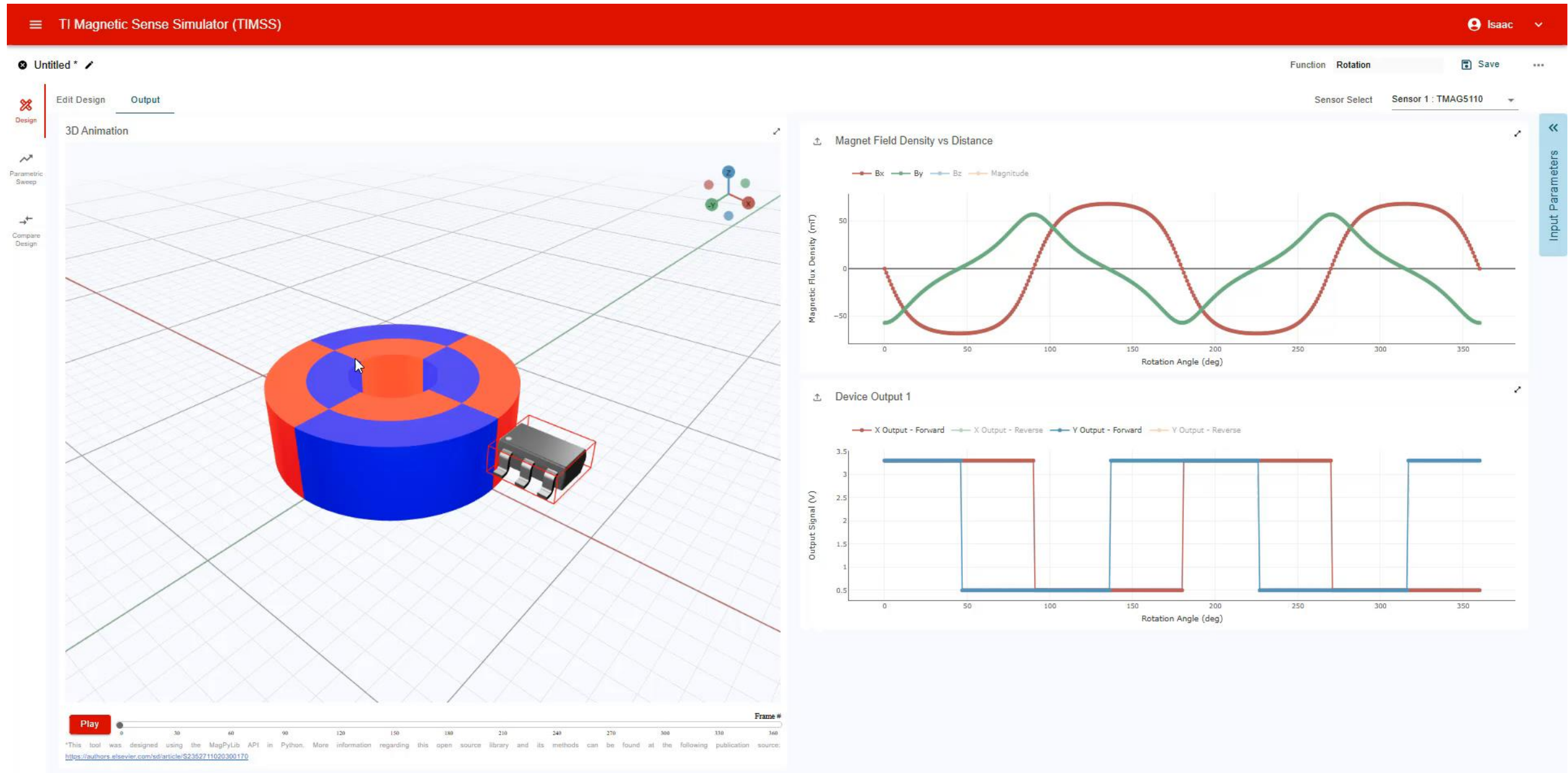
1. Select Function

- Hinge
- Linear
- Joystick
- Rotation
- Static Position

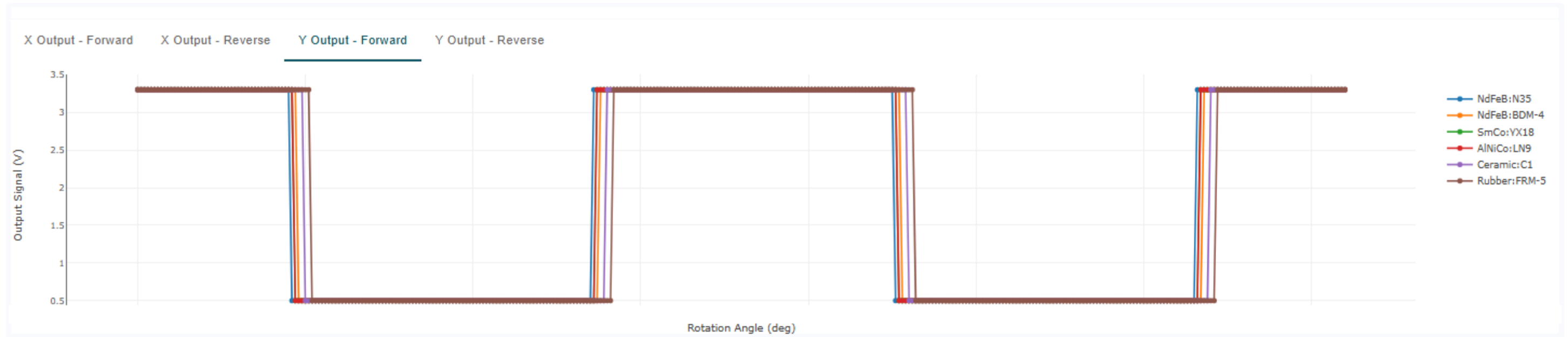
2. Select Magnet Shape

- Bar**
Pole Count: ≥ 2
Commonly used in:
Laptop lid closure
Limit detection
- Diametric Cylinder**
Pole Count: Only 2
Commonly used in:
Angle Measurements
End of Shaft Motor speed
- Axial Cylinder**
Pole Count: Only 2
Commonly used in:
Trigger detection
Joystick
- Ring**
Pole Count: ≥ 2
Commonly used in:
Angle Measurements
On Shaft motor speed
- Axial Ring**
Pole Count: ≥ 2
Commonly used in:
Angular Incremental Encoding
- Sphere**
Pole Count: Only 2
Spherical magnets field contour is closest to an ideal magnetic dipole

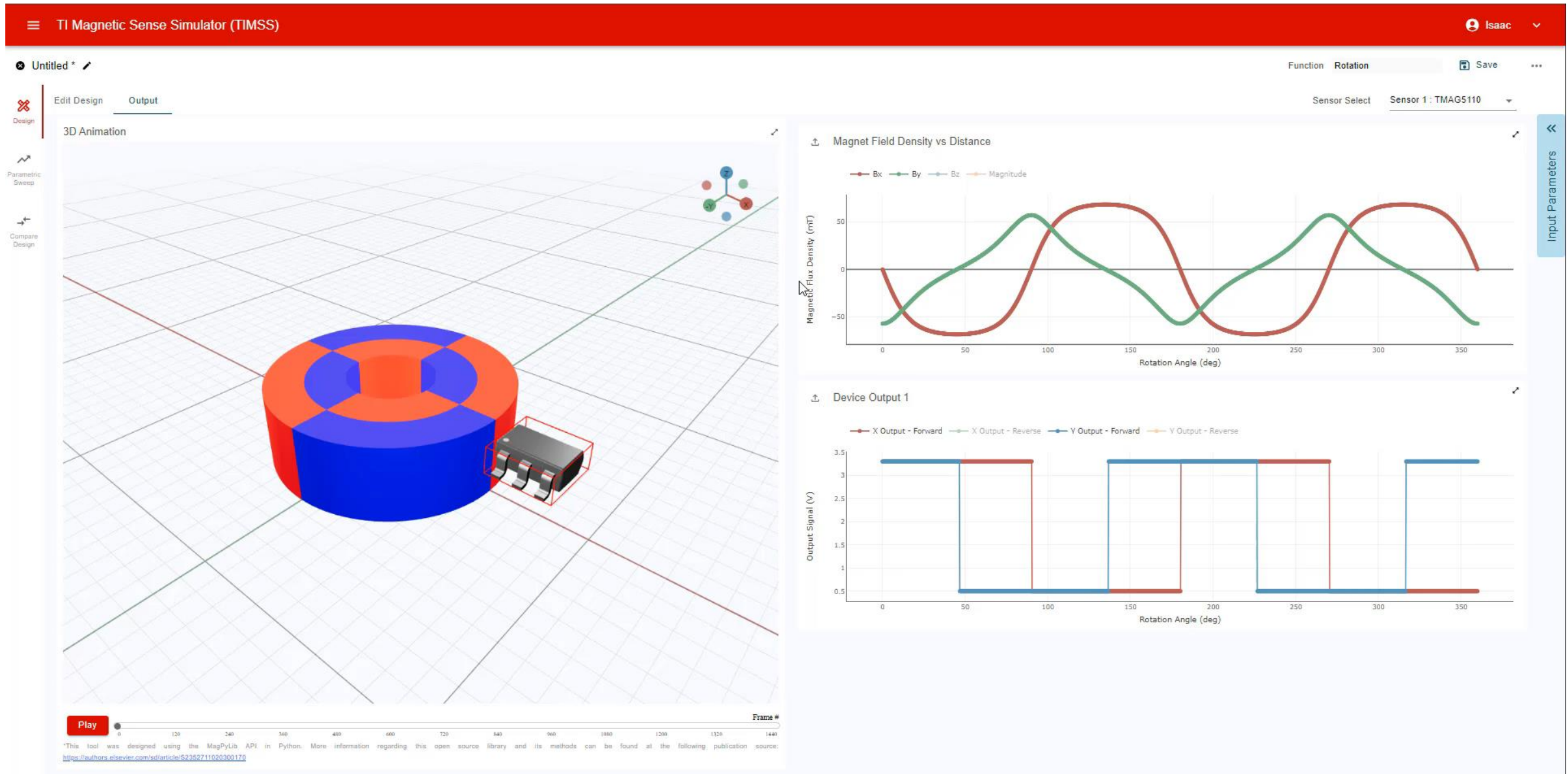
Single parametric sweep example



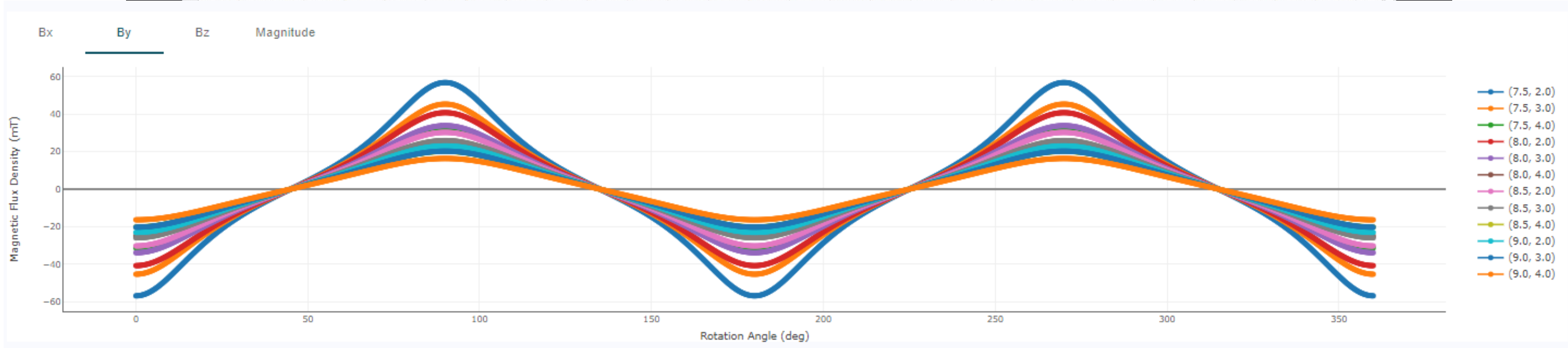
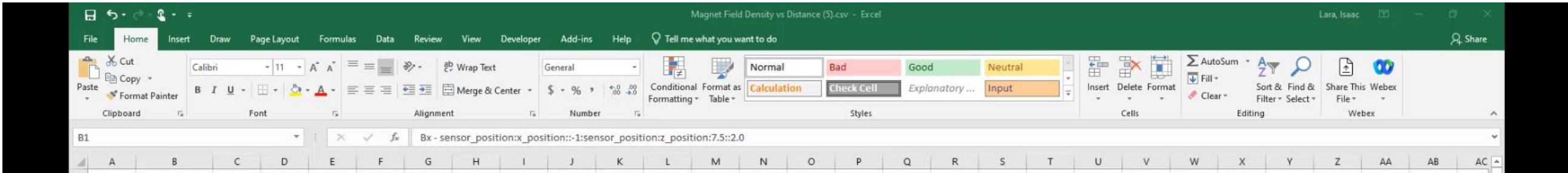
Results



Combinational parametric sweep example



Results



29	6.75	-27.25746132	-18.2686	-8.49052	-18.5865	-13.3091	-7.27649	-13.2579	-10.0131	-6.1175	-9.78873	-7.71636	-5.11187	-51.5514	-41.5819	-29.2704	-37.7457	-31.5889	-23.6235	-28.3801	-24.4444	-19.1363	-21.8199	-19.2243	-15.5947	-6.59048	-11.9867	-11.0577	-4.24
30	7	-28.13725451	-18.8652	-8.77627	-19.2091	-13.7586	-7.52655	-13.7119	-10.358	-6.33056	-10.1288	-7.98557	-5.29155	-51.1894	-41.3228	-29.1265	-37.5334	-31.4274	-23.5219	-28.2458	-24.3372	-19.0626	-21.7298	-19.1496	-15.5399	-6.81128	-12.3884	-11.4355	-4.3
31	7.25	-29.00472163	-19.454	-9.05918	-19.8252	-14.2038	-7.77463	-14.1622	-10.7003	-6.54224	-10.4666	-8.25307	-5.47022	-50.8192	-41.0575	-28.9787	-37.3154	-31.2616	-23.4174	-28.1076	-24.2269	-18.9867	-21.637	-19.0726	-15.4833	-7.02979	-12.786	-11.8101	-4.53
32	7.5	-29.85970595	-20.0351	-9.3392	-20.4347	-14.6446	-8.02071	-14.6087	-11.0399	-6.75249	-10.802	-8.51882	-5.64787	-50.4412	-40.7861	-28.8271	-37.0921	-31.0914	-23.31	-27.9657	-24.1134	-18.9085	-21.5416	-18.9934	-15.425	-7.24596	-13.1793	-12.1814	-4.67
33	7.75	-30.70207148	-20.6083	-9.61628	-21.0375	-15.0808	-8.26472	-15.0513	-11.3768	-6.96129	-11.1349	-8.78277	-5.82446	-50.0557	-40.509	-28.6717	-36.8635	-30.9171	-23.1997	-27.8202	-23.997	-18.8282	-21.4436	-18.9119	-15.365	-7.45975	-13.5684	-12.5495	-4.82
34	8	-31.53170242	-21.1736	-9.89036	-21.6335	-15.5126	-8.50664	-15.4899	-11.7108	-7.16859	-11.4654	-9.04489	-5.99996	-49.6634	-40.2265	-28.5127	-36.63	-30.7387	-23.0867	-27.6711	-23.8776	-18.7457	-21.343	-18.8283	-15.3034	-7.67113	-13.9531	-12.9142	-4.96
35	8.25	-32.34850269	-21.7308	-10.1614	-22.2225	-15.9397	-8.74643	-15.9244	-12.042	-7.37437	-11.7934	-9.30512	-6.17436	-49.2644	-39.9387	-28.3503	-36.3916	-30.5565	-22.9709	-27.5185	-23.7554	-18.6611	-21.2399	-18.7425	-15.2401	-7.88005	-14.3334	-13.2754	-5.09
36	8.5	-33.15239529	-22.2799	-10.4294	-22.8045	-16.362	-8.98404	-16.3549	-12.3702	-7.5786	-12.1188	-9.56344	-6.34762	-48.8593	-39.6461	-28.1844	-36.1486	-30.3705	-22.8525	-27.3626	-23.6304	-18.5745	-21.1344	-18.6547	-15.1752	-8.08649	-14.7093	-13.6332	-5.23
37	8.75	-33.9433217	-22.8209	-10.6943	-23.3794	-16.7797	-9.21944	-16.7811	-12.6955	-7.78125	-12.4416	-9.81981	-6.51973	-48.4485	-39.3488	-28.0153	-35.9012	-30.181	-22.7315	-27.2035	-23.5027	-18.4859	-21.0264	-18.5648	-15.1088	-8.29042	-15.0807	-13.9874	-5.37
38	9	-34.72124117	-23.3537	-10.956	-23.9471	-17.1925	-9.45261	-17.2031	-13.0178	-7.98228	-12.7617	-10.0742	-6.69066	-48.0323	-39.047	-27.843	-35.6496	-29.9879	-22.608	-27.0412	-23.3723	-18.3953	-20.9162	-18.4729	-15.0408	-8.49182	-15.4475	-14.3381	-5.50

Learn more

- TI Magnetic Sense Simulator Product Folder
<https://www.ti.com/TIMSS>
- TI Magnetic Sense Simulator User's Guide
<https://www.ti.com/lit/ug/slyu067/slyu067.pdf>
- TI Magnetic Sense Simulator App Brief
<https://www.ti.com/lit/ab/slya083/slya083.pdf>
- Position Sensing Demo Video Series
<https://www.ti.com/video/series/position-sensing-demos.html>
- TI Precision Labs: Magnetic Sensor Training Videos
<https://www.ti.com/video/series/precision-labs/ti-precision-labs-magnetic-sensors.html>
- Sensors E2E Forum
<https://e2e.ti.com/support/sensors-group/sensors/f/sensors-forum>
- TI Magnetic Sensor Portfolio
<https://www.ti.com/magneticsensors>

To start your simulation now, visit:
www.ti.com/timss/



© Copyright 2024 Texas Instruments Incorporated. All rights reserved.

This material is provided strictly “as-is,” for informational purposes only, and without any warranty.
Use of this material is subject to TI’s **Terms of Use**, viewable at [TI.com](https://www.ti.com)