

Magnetostatic Analysis of Study 1

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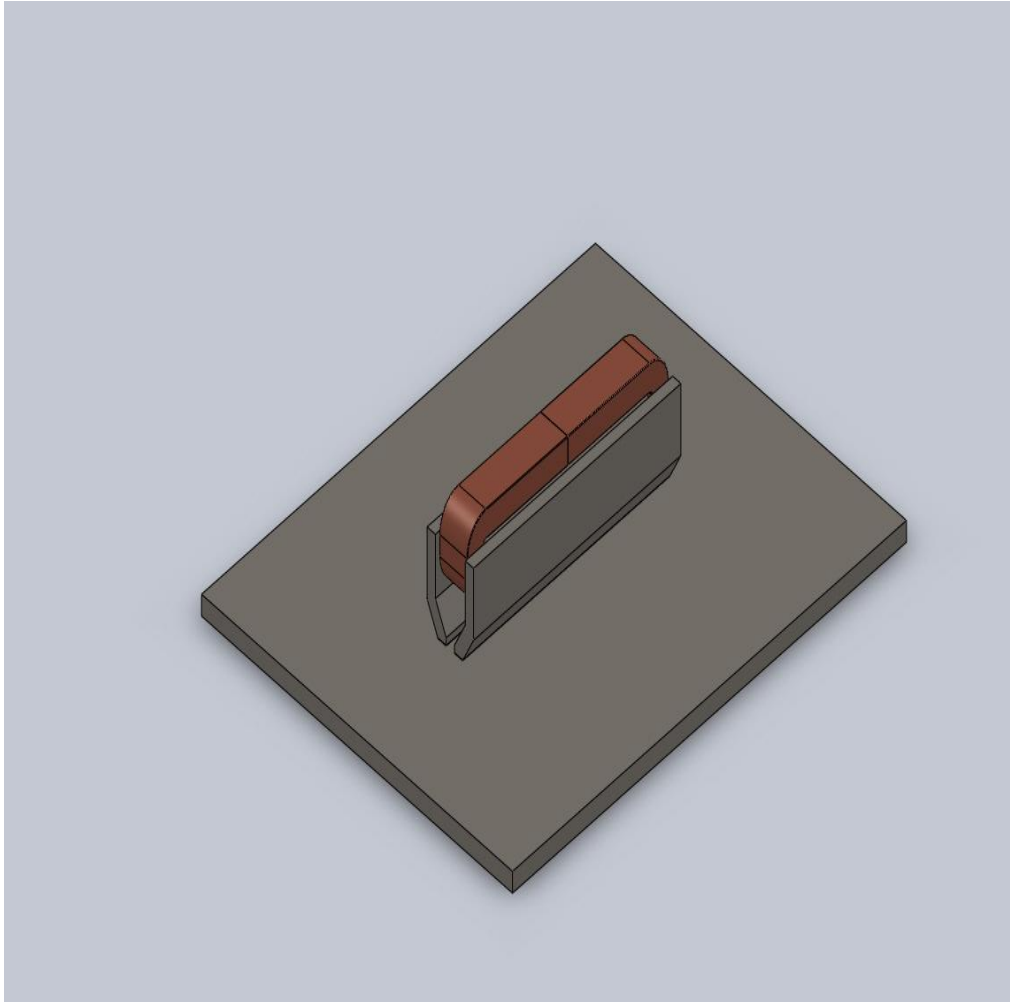
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1. Introduction

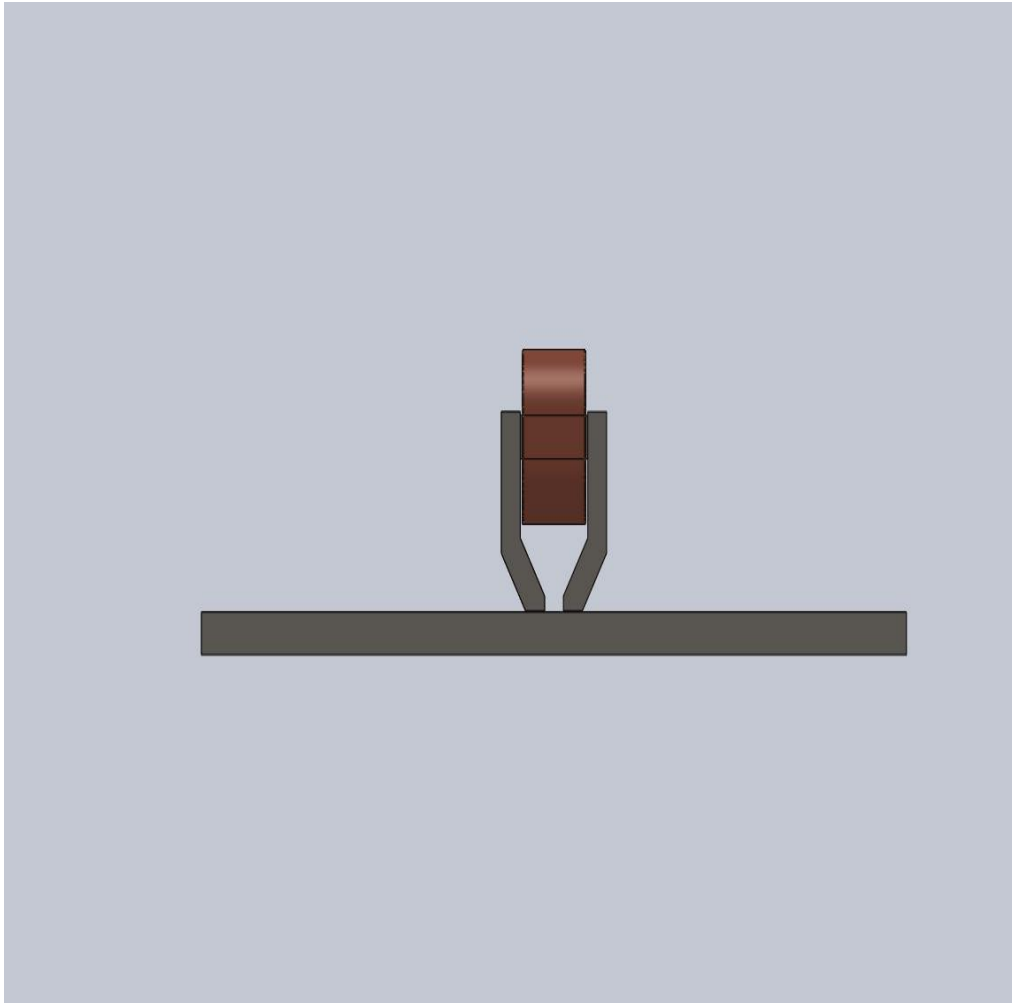
This report covers the magnetic parameters resulting from a static analysis of a steel plate that is lifted using an electromagnet. The force applied on the steel plate is a result of the electromagnetic phenomena.

2. Model View

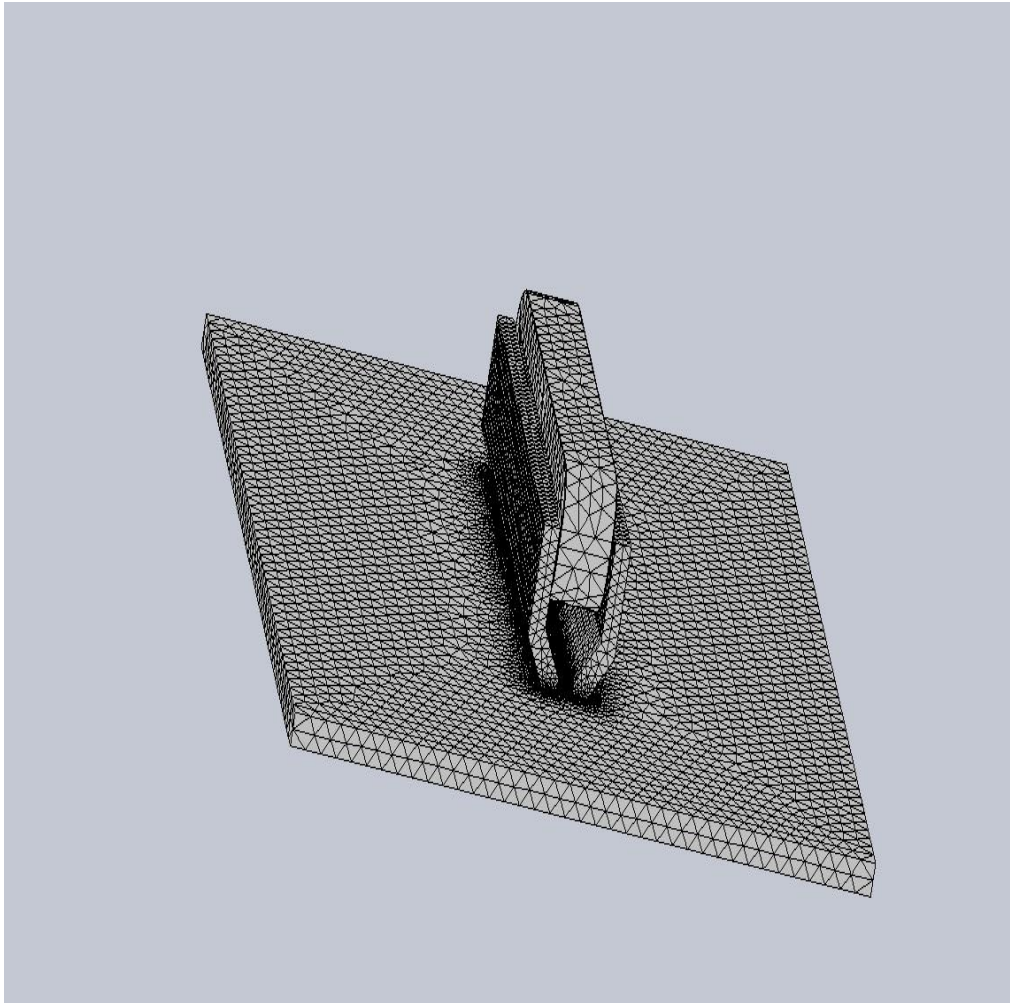
Assy-magnet-parasolid_Isometric View



Assy-magnet-parasolid_Front View



Assy-magnet-parasolid_Current View (Mesh)



3. Materials

Note: R.P. stands for Relative Permeability

| Nb r. | Part Name | Material Name | Permeability Type |
|-------|---|---------------------------|-------------------|
| 1 | 0109001-510 vb(Default_As Machined_-)1-Body 1 (Split2[1]) | Aluminium | Isotropic |
| 2 | 0109001-510 vb(Default_As Machined_-)1-Body 2 (Split2[2]) | Aluminium | Isotropic |
| 3 | InnerAir^Assy-magnet-parasolid-1-Body 1 (Extrude1[1]) | Air | Isotropic |
| 4 | InnerAir^Assy-magnet-parasolid-1-Body 2 (Extrude1[2]) | Air | Isotropic |
| 5 | Kern(Default_As Machined_-)1-Body 1 (Imported1) | Steel1010 | Isotropic |
| 6 | OuterAir^Assy-magnet-parasolid-1-Body 1 (Cavity1) | Air | Isotropic |
| 7 | Side(Default_As Machined_-)1-Body 1 (Imported1) | Steel1010 | Isotropic |
| 8 | Side(Default_As Machined_-)2-Body 1 (Imported1) | Steel1010 | Isotropic |
| 9 | Steelplate(Default_As Machined_-)1-Body 1 (Cut-Extrude1) | Steel1010 | Isotropic |

4. Coils Information

Coils

| Nb r. | Name | Nbr.Of Turns | Magnitude | Phase | Components & Bodies |
|-------|----------------|--------------|---------------|----------------|--|
| 1 | Wound Coil - 1 | 1000 | 1.736000e+001 | 0.0000e+000deg | 0109001-510 vb(Default_As Machined_-)1 |

5. Force and Torque Information

| Nbr. | Name | Torque Center | Components & Bodies |
|------|------------------|---------------|------------------------------------|
| 1 | Virtual Work - 1 | At origin | Steelplate(Default_As Machined_)-1 |

6. Study Properties

Mesh Information

| Nbr.Of Nodes | Nbr.Of Elements | Element Size (m) | Tolerance (m) |
|--------------|-----------------|------------------|---------------|
| 52648 | 311884 | 0.500000 | 0.000100 |

Mesh Controls information

| Nb r. | Name | Mesh Size | Size Unit | Components & Bodies | Selected Faces |
|-------|-----------------|-----------|-----------|--|----------------|
| 1 | MeshControl - 1 | 40.000000 | mm | Steelplate(Default_As Machined_)-1 | |
| 2 | MeshControl - 2 | 20.000000 | mm | Side(Default_As Machined_)-1 Side(Default_As Machined_)-2 Kern(Default_As Machined_)-1 | |
| 3 | MeshControl - 3 | 40.000000 | mm | 0109001-510 vb(Default_As Machined_)-1 | |

| | | | | | |
|---|-----------------|----------|----|------------|--|
| 4 | MeshControl - 4 | 5.000000 | mm | InnerAir-1 | |
|---|-----------------|----------|----|------------|--|

Solver information

| Solver Type | Nbr. Current Increments | Compute Circuit Parameters |
|---------------|-------------------------|----------------------------|
| Direct Solver | 1 | No |

7. Results Table

Force Results

| | Fx-axis (N) | Fy-axis (N) | Fz-axis (N) |
|------------------|---------------|---------------|---------------|
| Virtual Work - 1 | 3.295106e+001 | 6.863264e+004 | 6.932427e+000 |

Torque Results

| | Tx-axis (N.m) | Ty-axis (N.m) | Tz-axis (N.m) |
|------------------|---------------|---------------|----------------|
| Virtual Work - 1 | 7.209524e+001 | 3.391378e+000 | -6.157644e+000 |

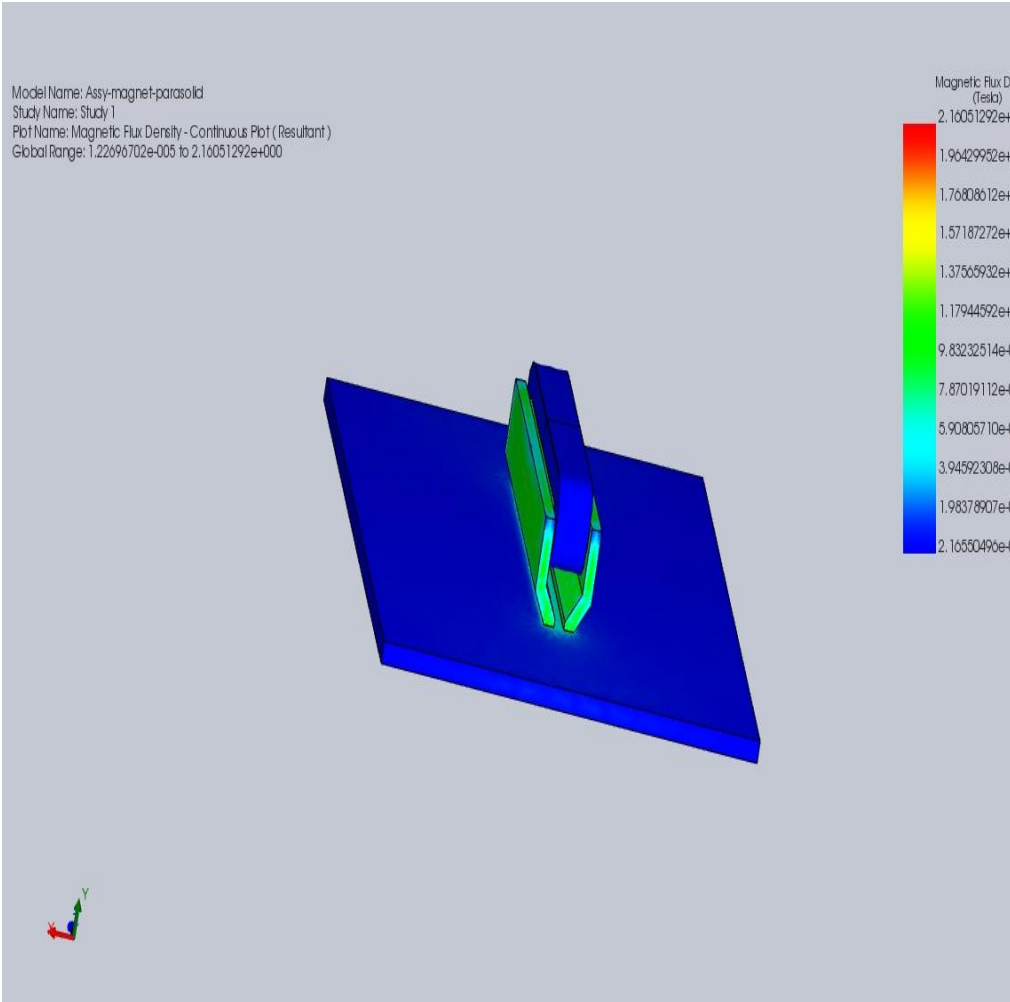
Energy Results

| Energy (J) | Co-Energy (J) |
|---------------|---------------|
| 3.262926e+002 | 1.301500e+003 |

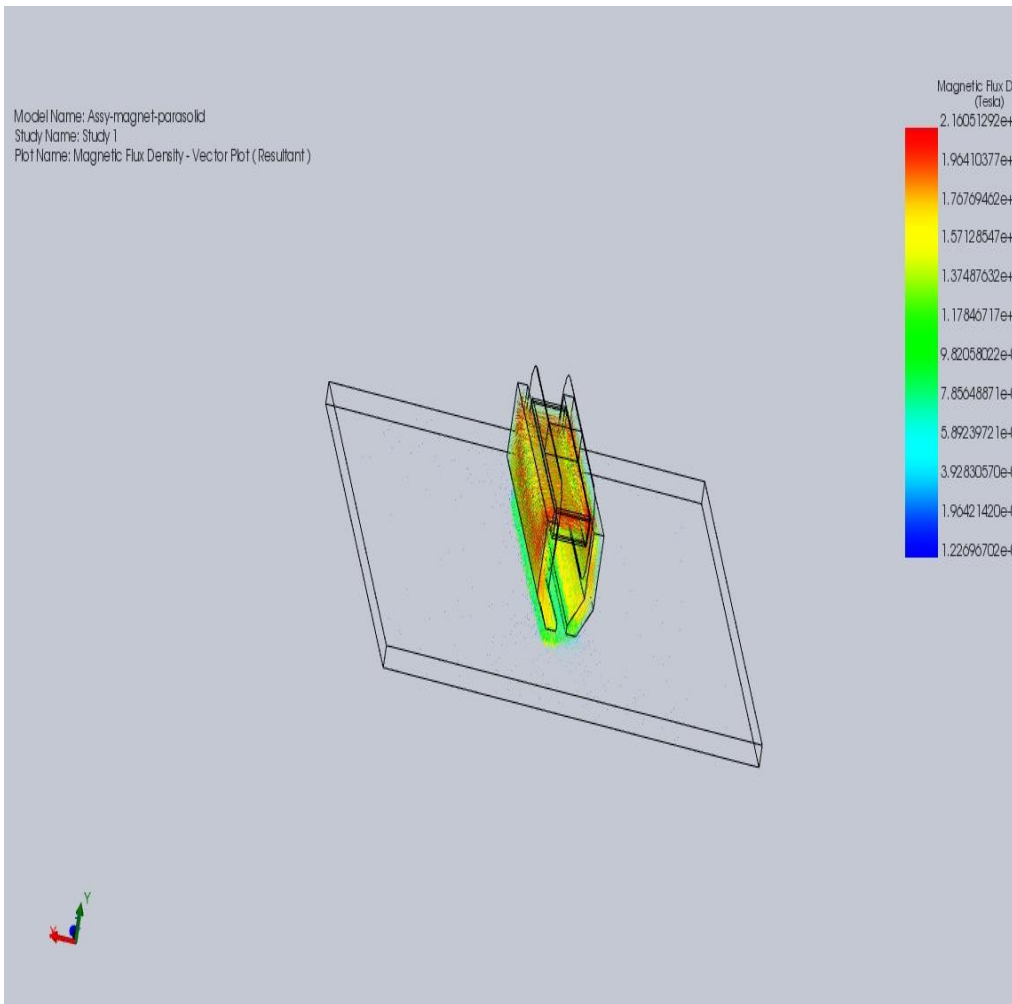
8. Magnetic Flux Density Results

Magnetic Flux Density - Continuous Plot

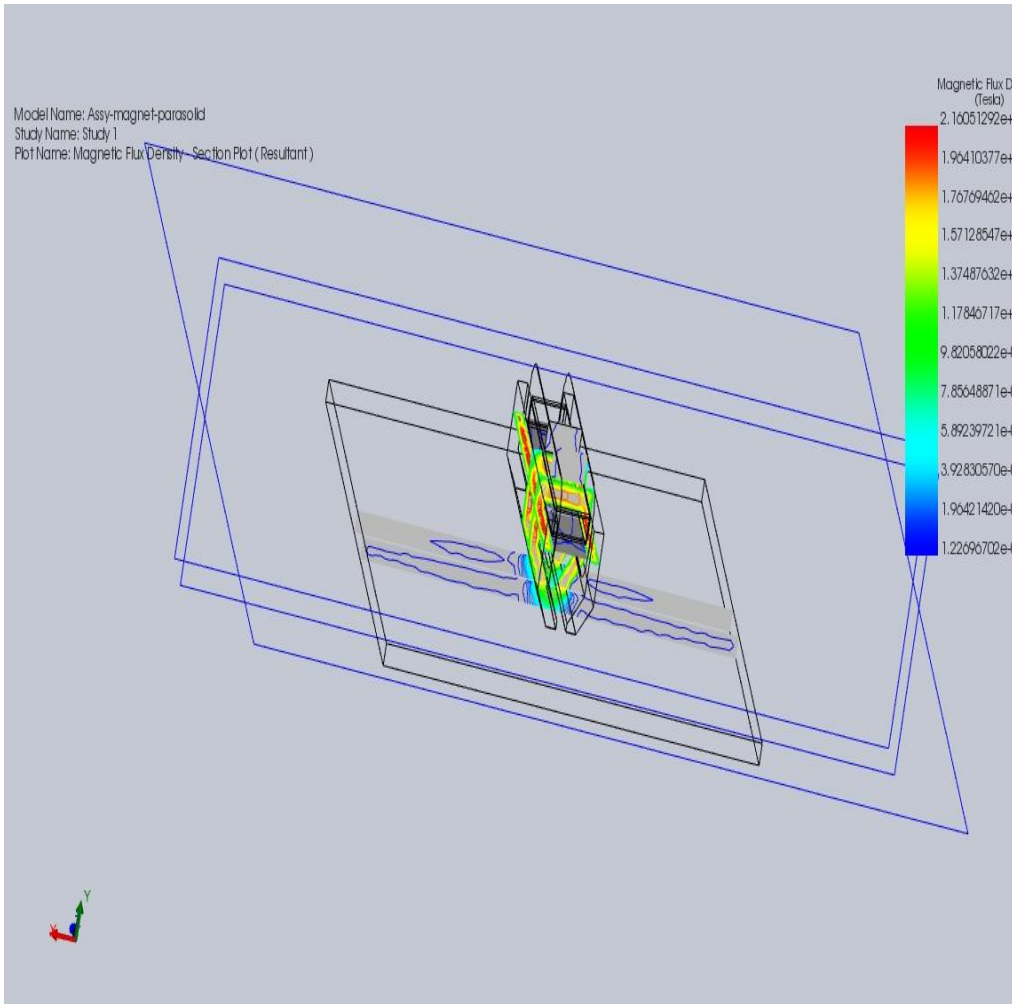
JPEG



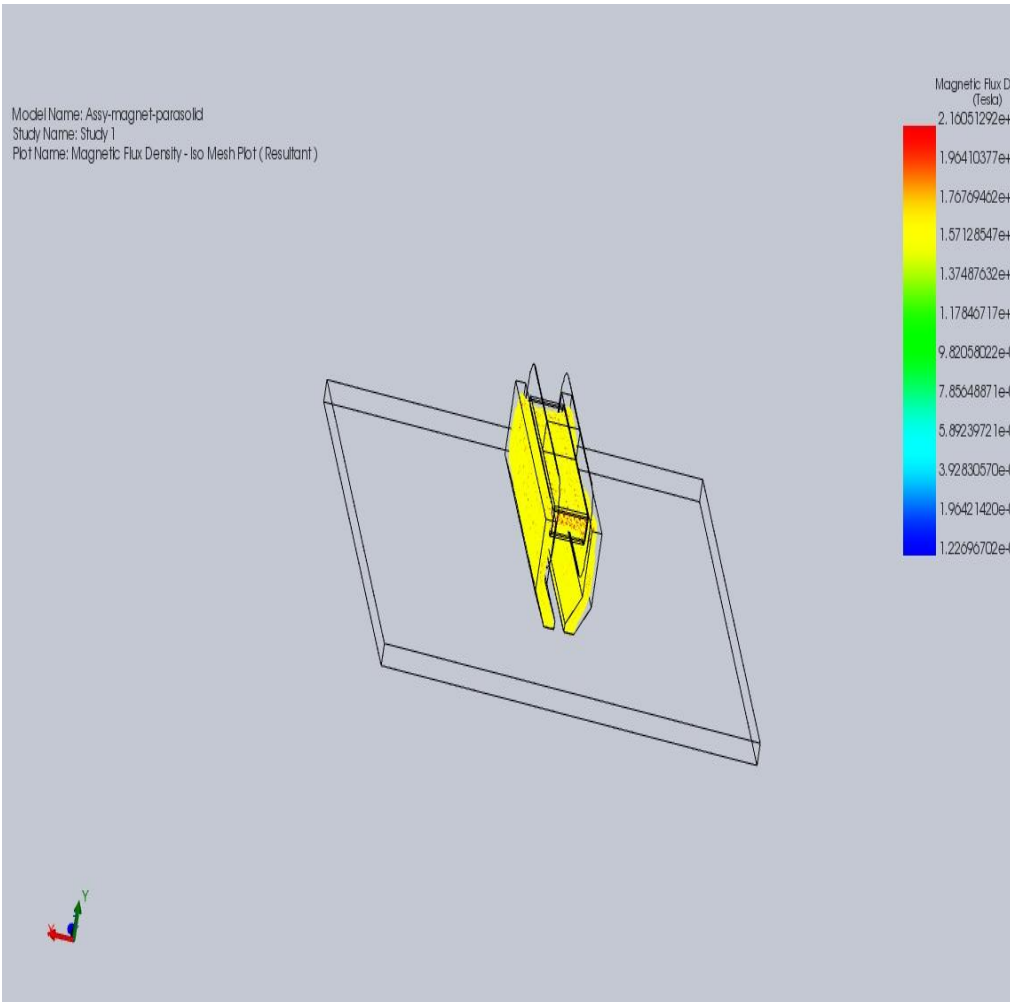
Magnetic Flux Density - Vector Plot



Magnetic Flux Density - Section Plot

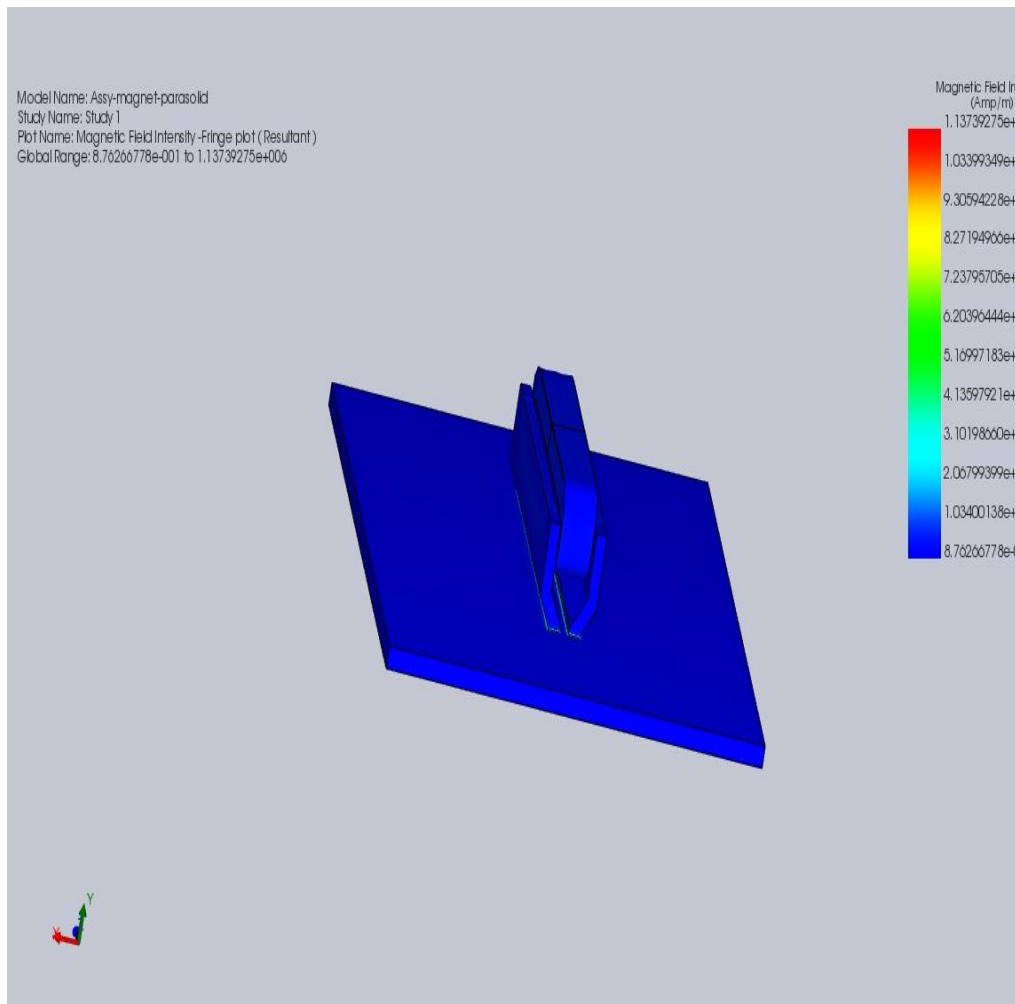


Magnetic Flux Density - Iso Mesh Plot

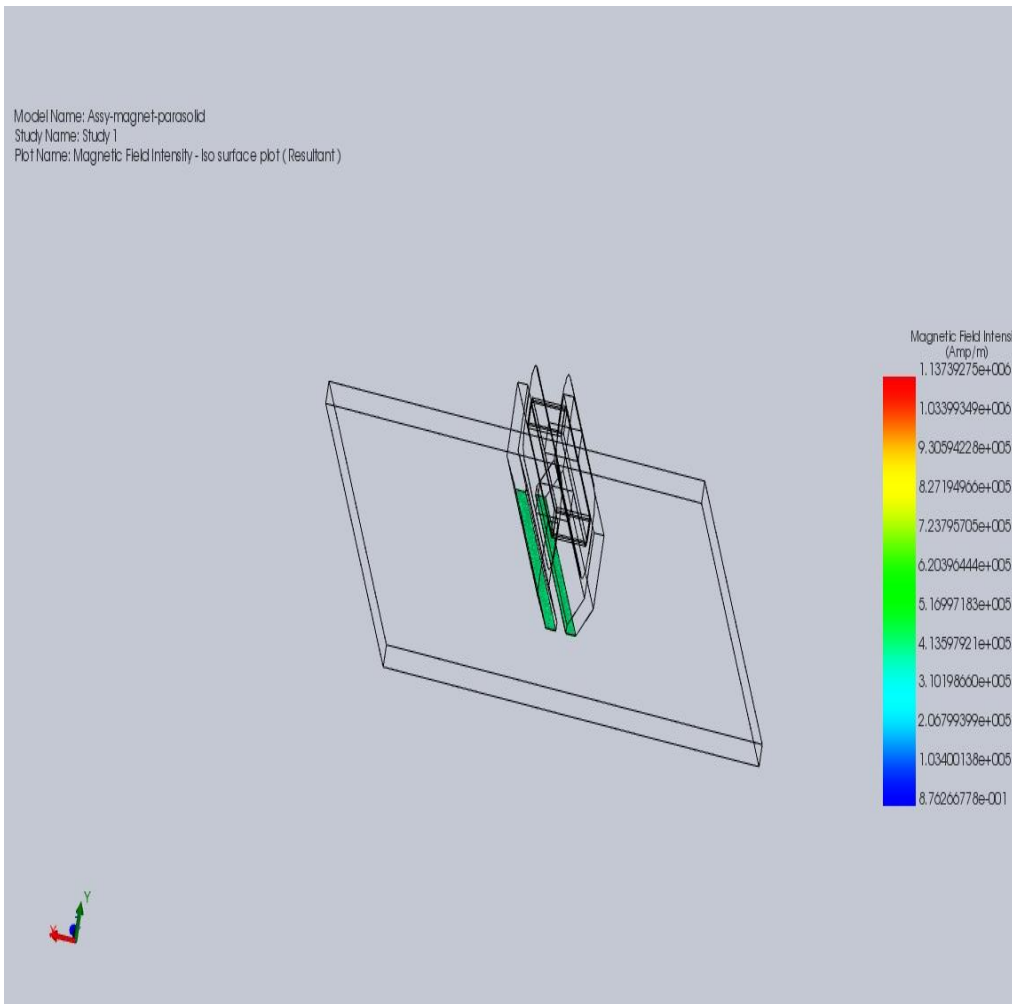


9. Magnetic Field Intensity Results

Magnetic Field Intensity -Fringe plot



Magnetic Field Intensity - Iso surface plot



10. Applied Current Density Results

Applied Current Density - Vector Plot

