1.

$$\mathcal{R} = \frac{l}{\mu_o * A} = \frac{0.01}{4 * \pi * 10^{-7} * 0.02} = 3.989 * 10^5$$

$$\emptyset = \frac{N * I}{\mathcal{R}} = 120 * \frac{100}{3.989 * 10^5} \approx 0.03\ Wb$$

$$B = \frac{\emptyset}{A} = 1.5\ Tesla$$

2.

$$L = \frac{\lambda}{I} = N * \frac{\emptyset}{I} = 25\ mH$$

3.

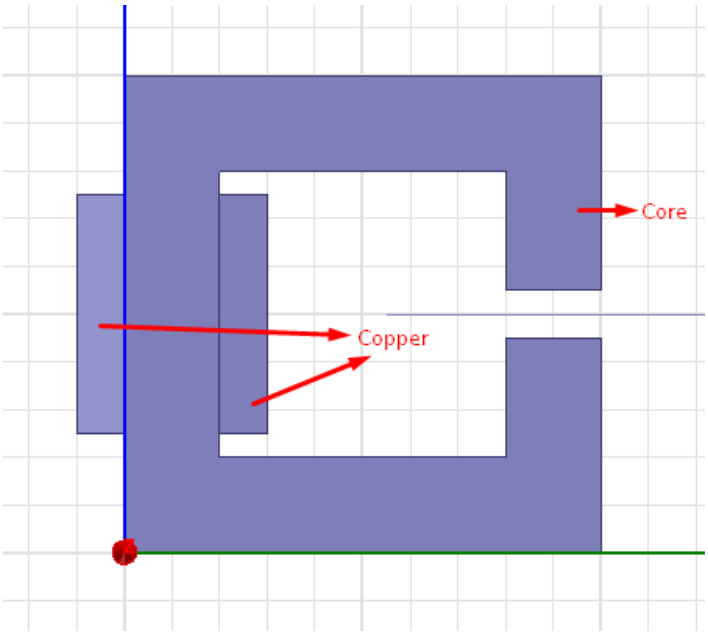

Figure 1: 2D C-Core

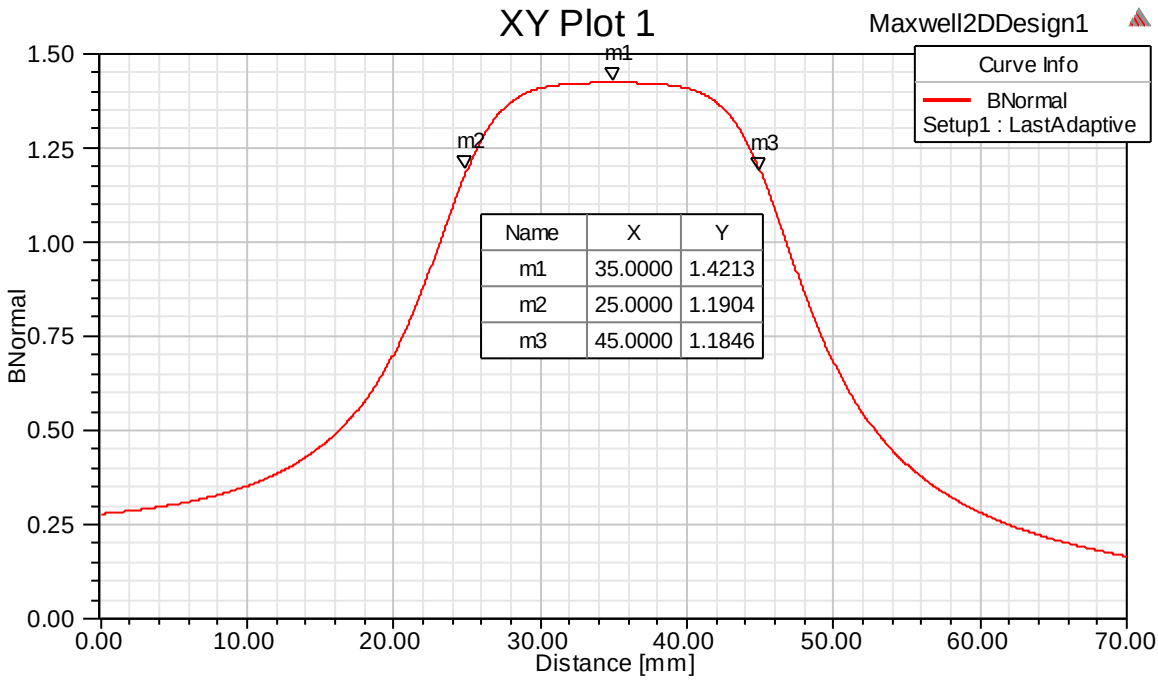

Figure 2: Flux Density Distribution around the gap for steel material without saturation

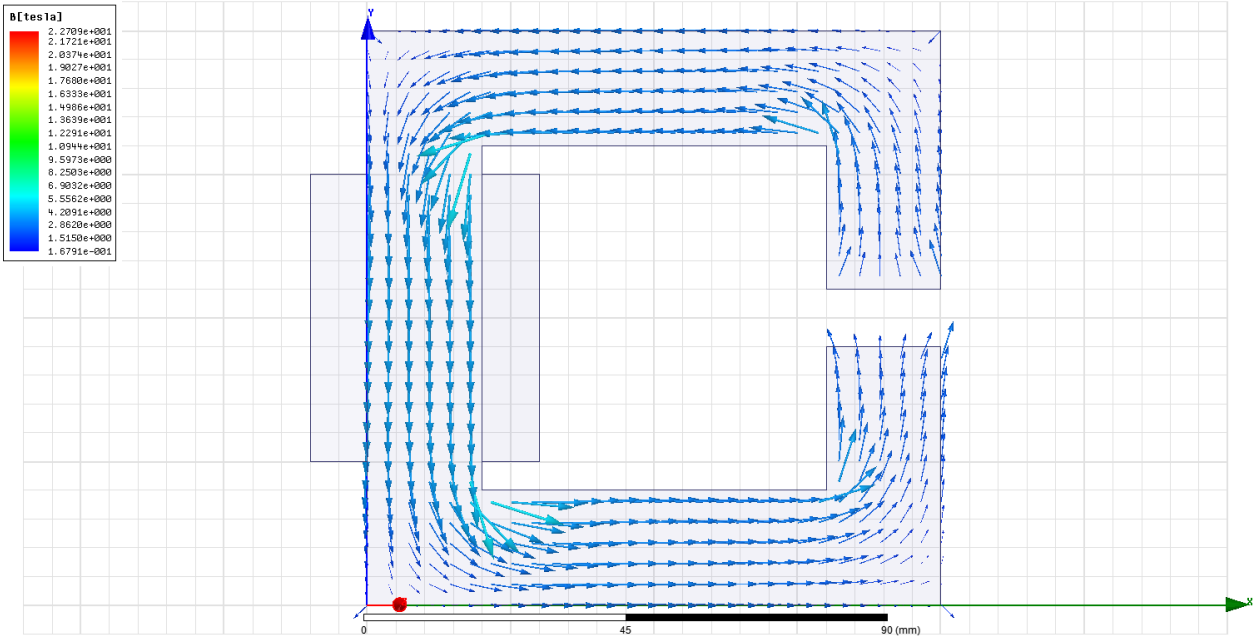

Figure 3: Flux Vectors for steel without saturation

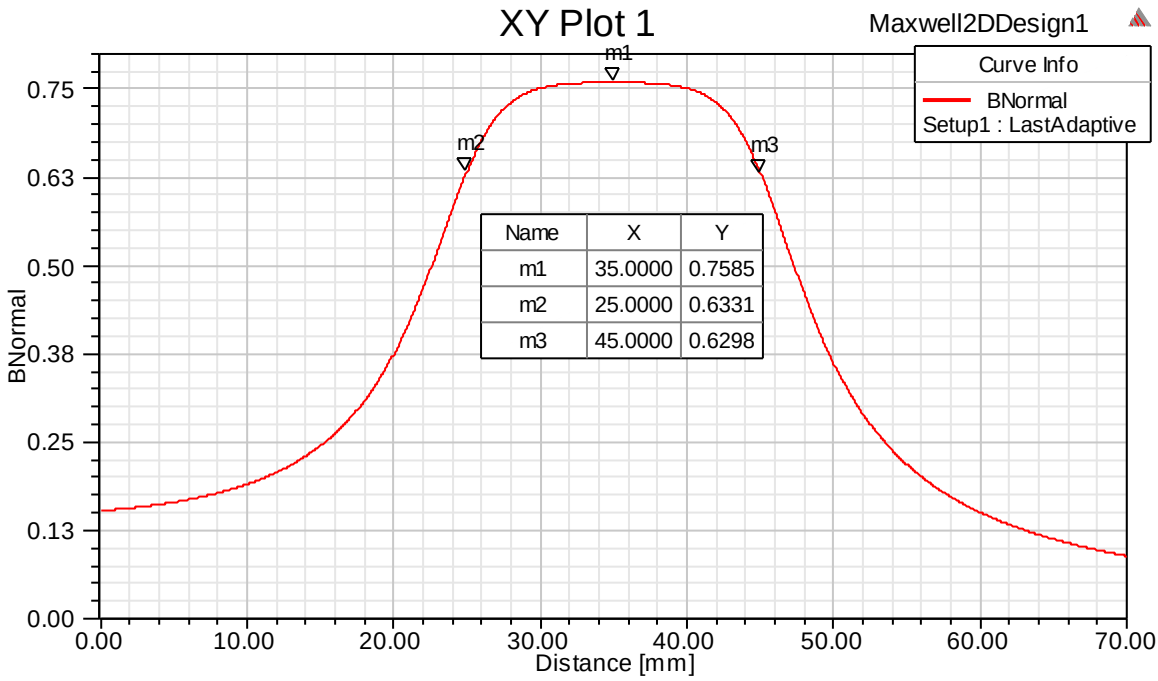

Figure 4: Flux Density Distribution around the gap for steel-1010 material

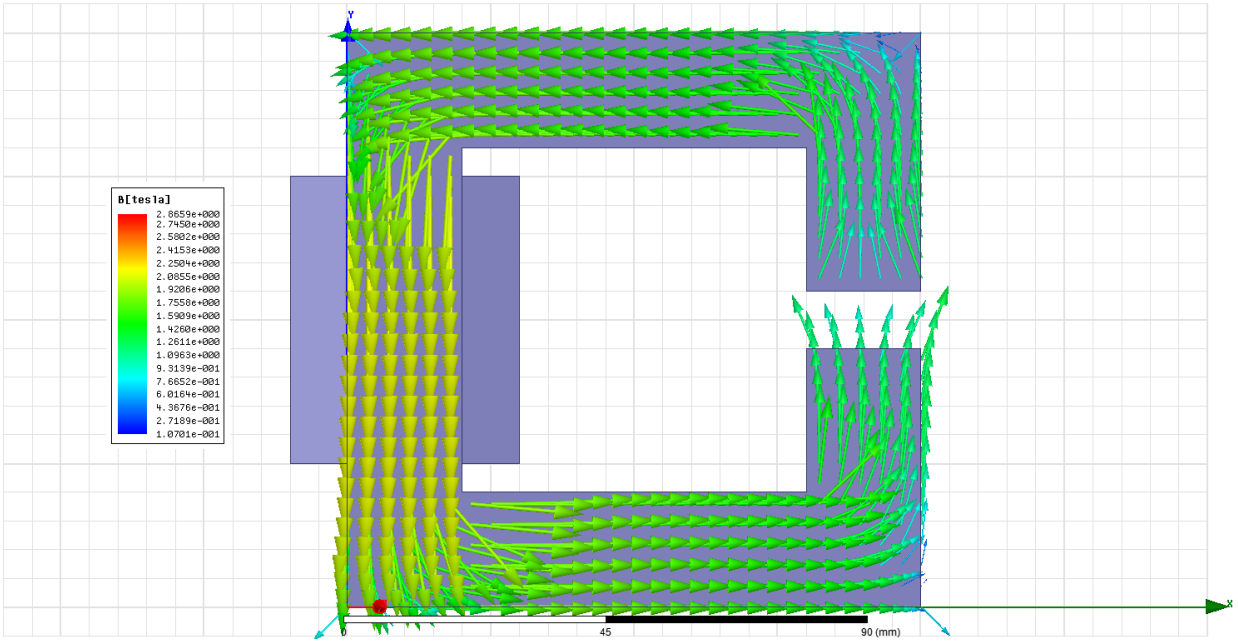

Figure 5: Flux Density Vectors for Steel-1010

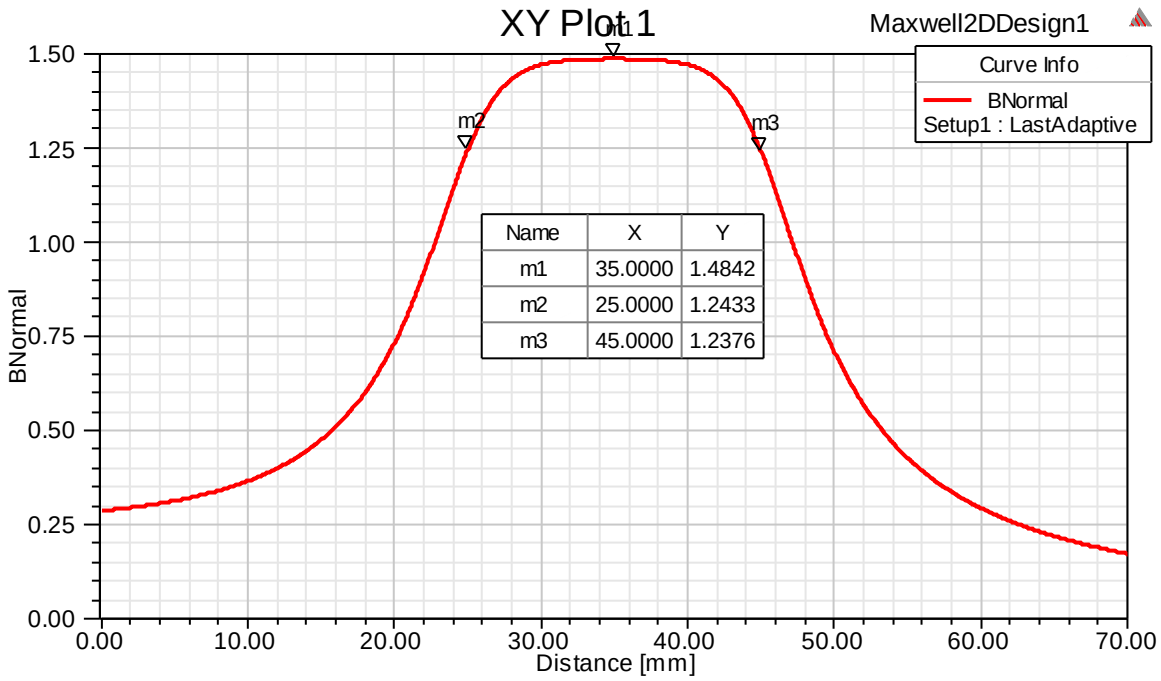

Figure 6: Flux Density Distribution around the gap for iron

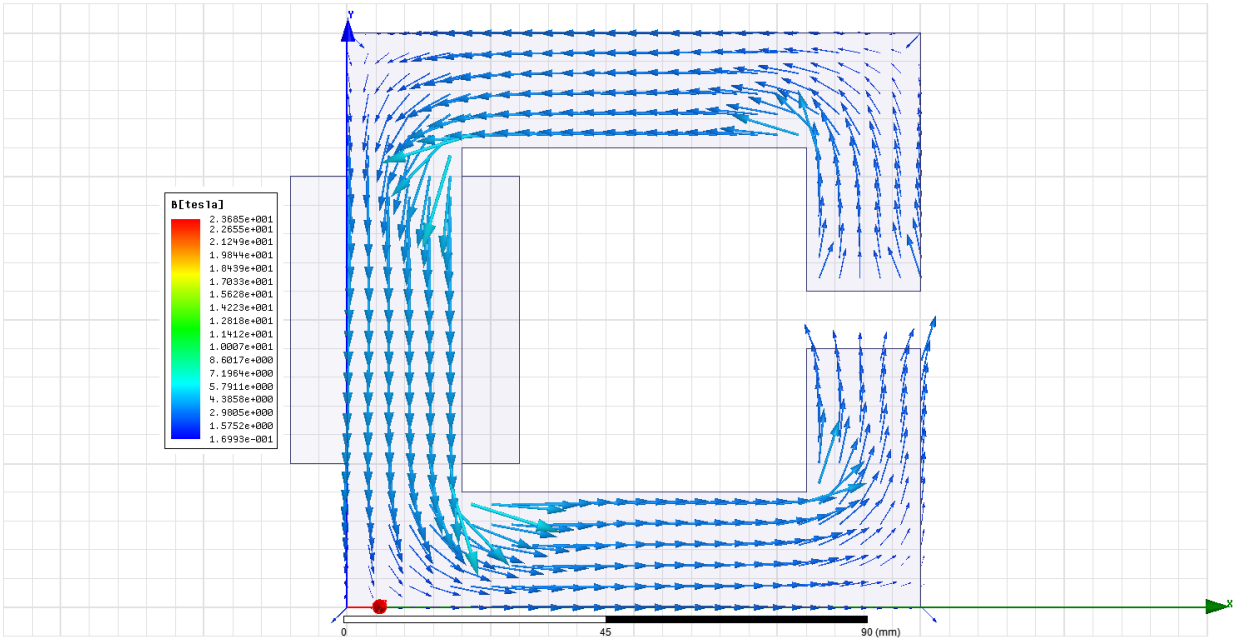

Figure 7: Flux Density Vectors for Iron Core

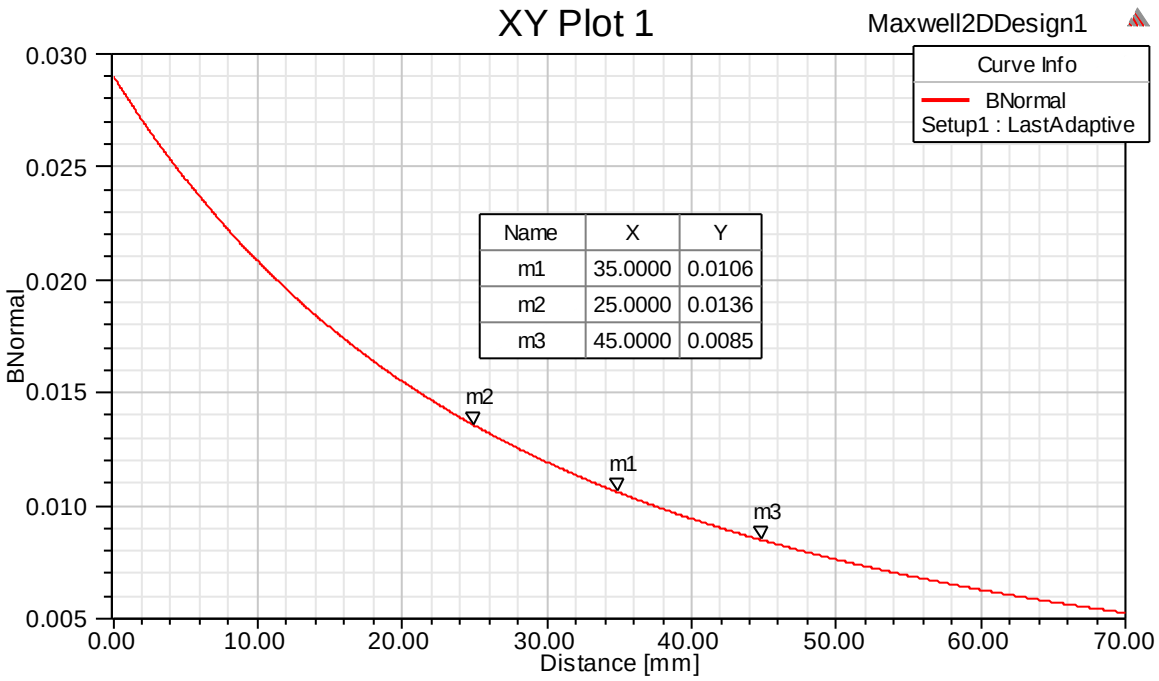

Figure 8: Flux Density Distribution around the gap for air-core

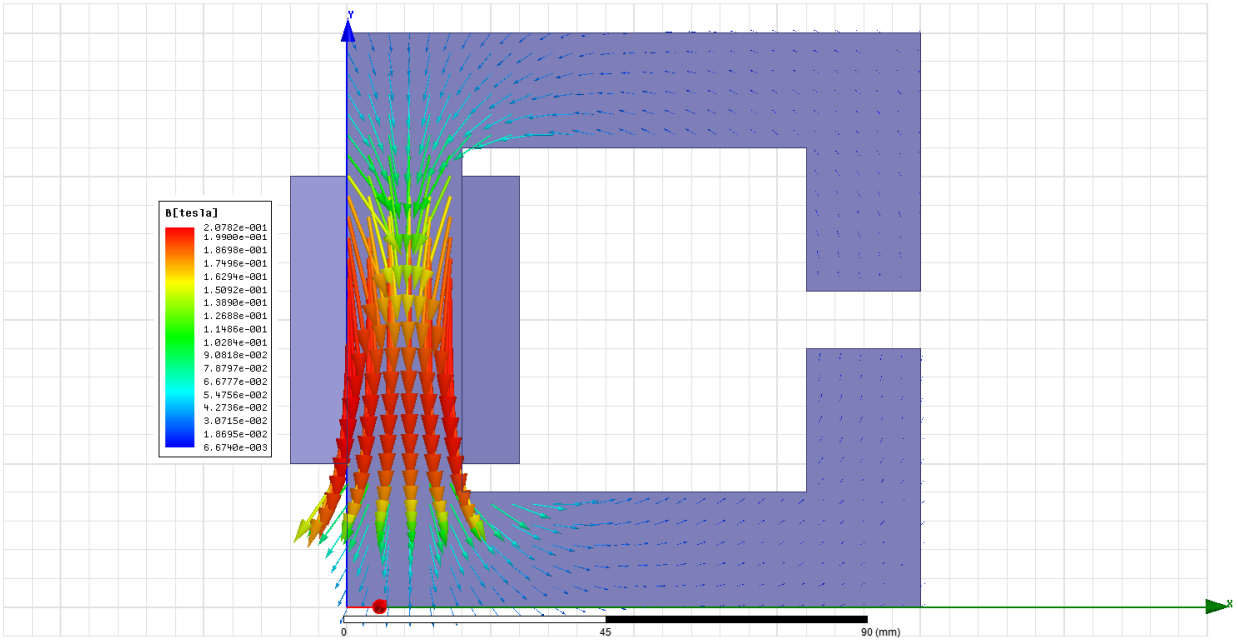

Figure 9: Flux Density Vectors for Air-Core

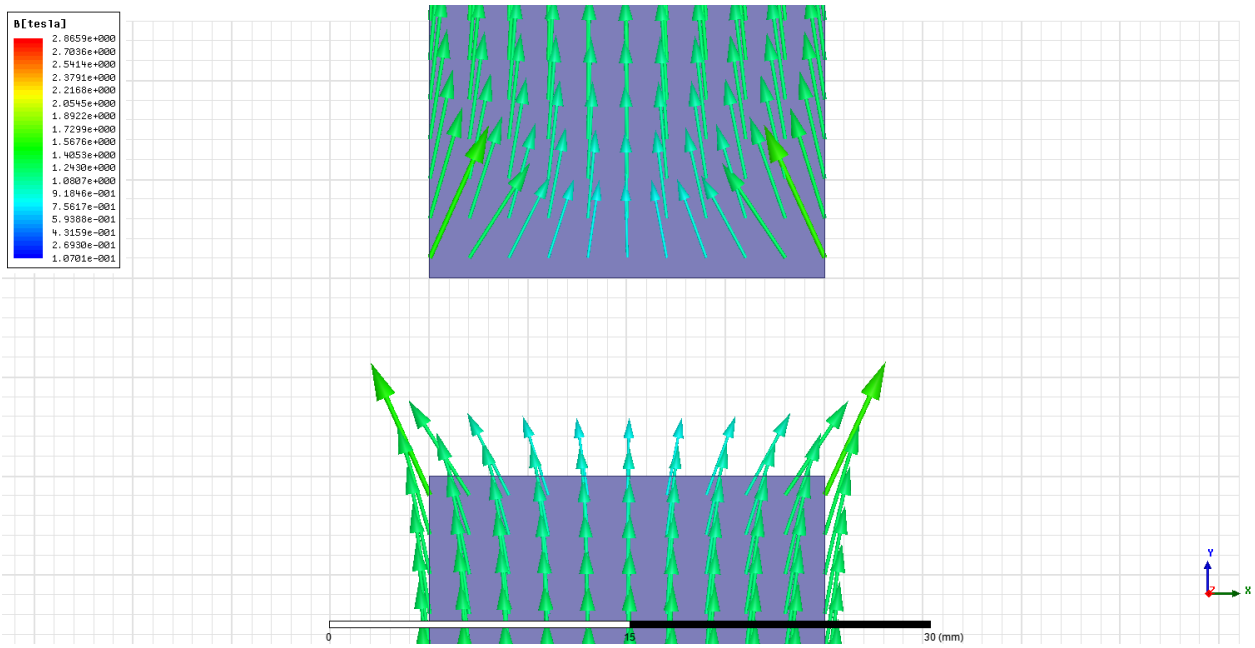

Figure 10: Flux Vectors around the air gap for unsaturated steel core

```
Scl : 0.0325946634393963
Scl : BtoFlux
```

Figure 11: Calculated Core Flux

```
Scl : 0.00294820438104474
Scl : Abs(Integrate(Line(Polyline4), Dot(B_Vector, LineNormal)))
```

Figure 12: Leakage Flux

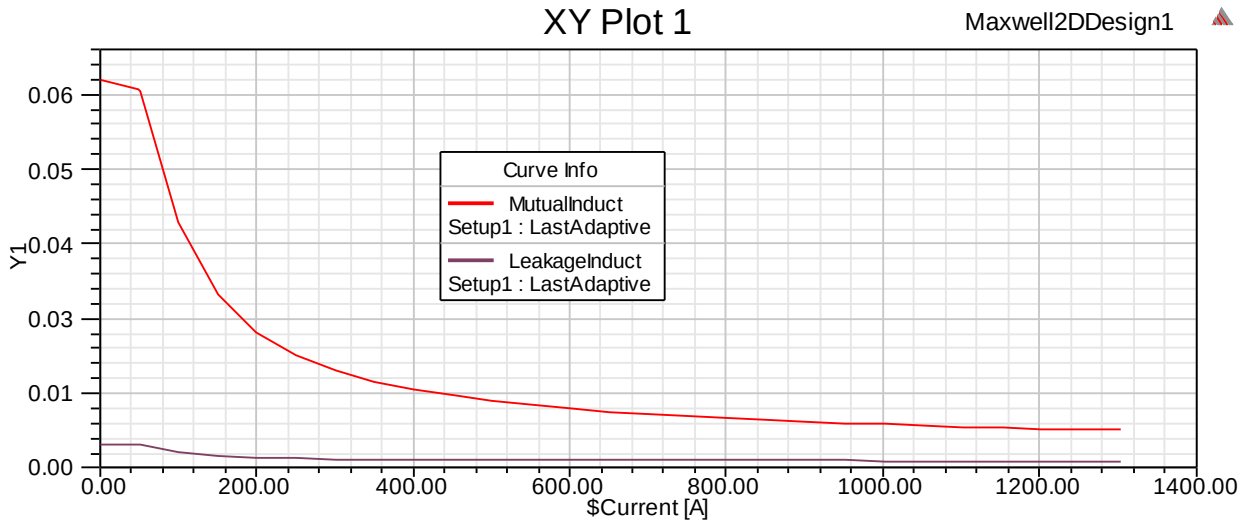

Figure 13: Self Inductance and Leakage Inductance for a wide current range