

My Favorite Equations #001 :

Approximate expression of Inductance of magnetic flux pickup coil suited in a gap of a magnet with a window-frame type Yoke.

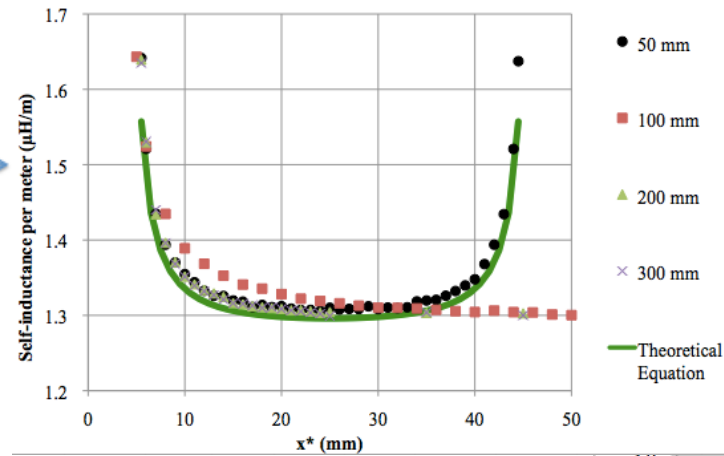
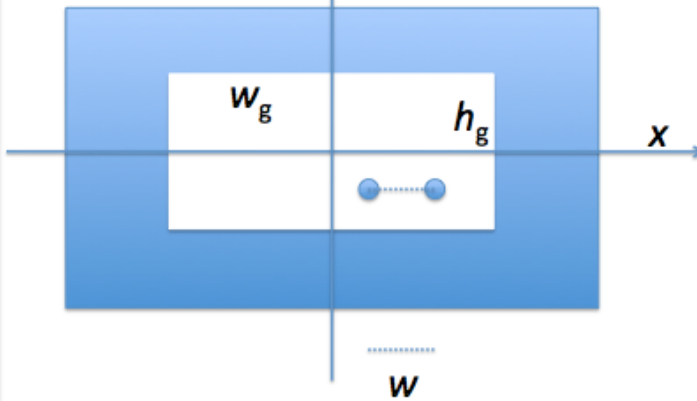
$$e^{-\{L(X,Y)/s-\frac{\mu_0}{4\pi}\}(\frac{\mu_0}{2\pi})} = \frac{a^2}{(w-a)^2} \frac{(H-2Y)^2+a^2}{(H-2Y)^2+(w-a)^2} \frac{(H+2Y)^2+a^2}{(H+2Y)^2+(w-a)^2} \frac{(W-2X)^2-(w-a)^2}{(W-2X)^2-a^2} \frac{(W+2X)^2-(w-a)^2}{(W+2X)^2-a^2}$$

$W = w_g$
 $H = h_g$

(X, Y) is the location of the center of a pickup coil.

“a” means the radius of a pickup coil.

Assumptions: $\mu_r = \infty$



Comparison with the calculated result by using 2D Maxwell code

Mod-Az plane with the center-located case by calculating theoretical equations. The right contour shows flux lines in the case without the Yoke effect.

