Equation modification:

Use generalized Lorenz gauge

$$\mathrm{div}\left(\epsilon\vec{A}\right) = i\omega\mu\epsilon^2\phi.$$

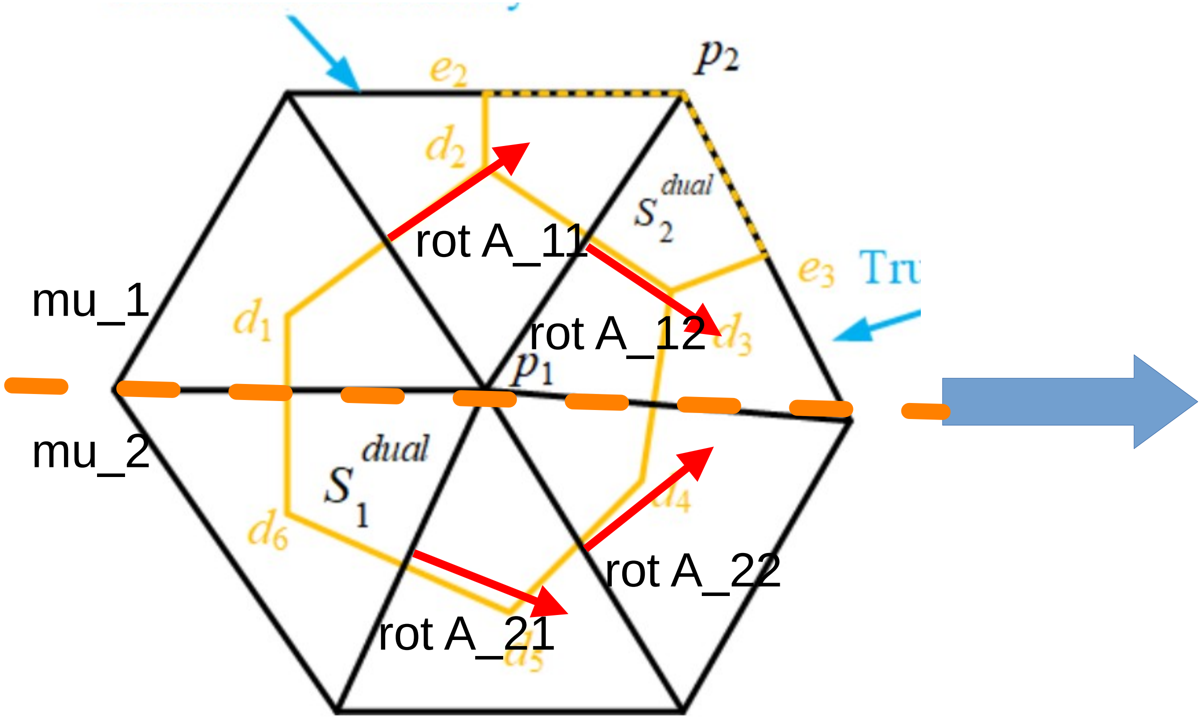
To obtain magnetostatic equation in the form

$$\mathrm{rot}\frac{1}{\mu}\mathrm{rot}\vec{A} = \epsilon\nabla\left(\frac{1}{\epsilon^2\mu}\mathrm{div}\left(\epsilon\vec{A}\right)\right) + \vec{J}_{ext}.$$

This term should not be dropped off.
Iterative solver is not stable without it!

Boundary conditions for magnetostatics

$$\vec{A}_1 = \vec{A}_2,$$
$$\frac{1}{\mu_1}\left[\mathrm{rot}\,\vec{A}_1\right]_\tau = \frac{1}{\mu_2}\left[\mathrm{rot}\,\vec{A}_2\right]_\tau$$



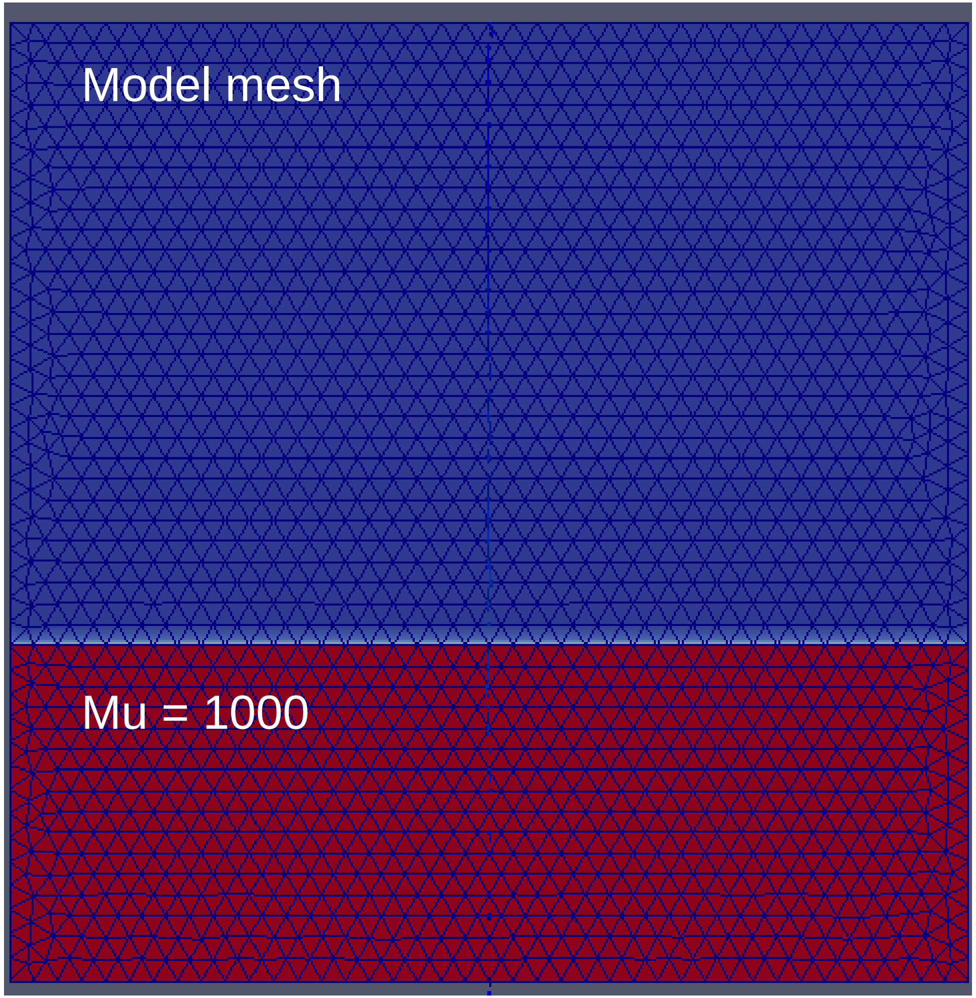
rot A_11 + rot A_12 approximately tangential, the same is true for rot A_21 + rot A_22

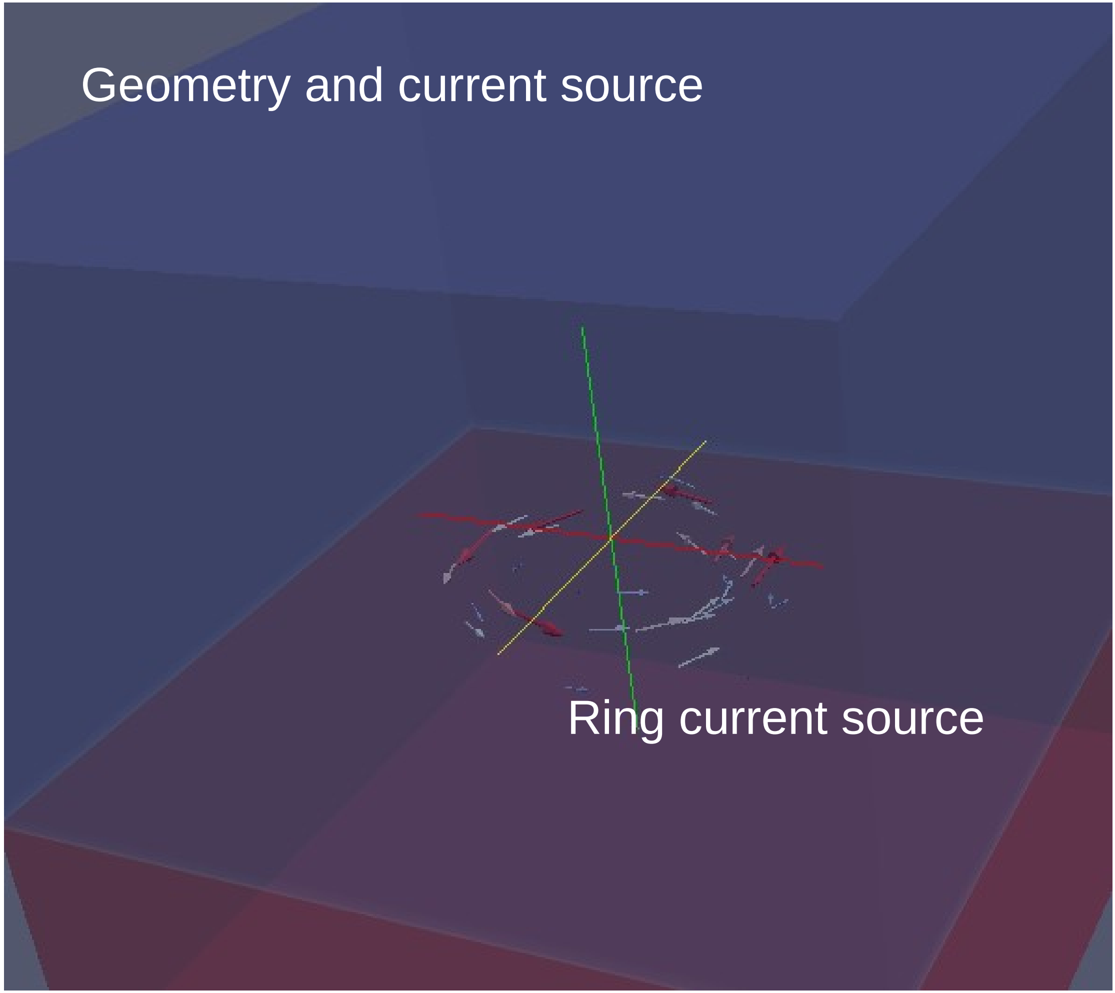
Condition for matrix assembly:
(rot A_11 + rot A_12)/mu_1 – (rot A_21 + rot A_22)/mu_2 = 0

Vector potential A on p1-edge on one side is equal to that on the other side

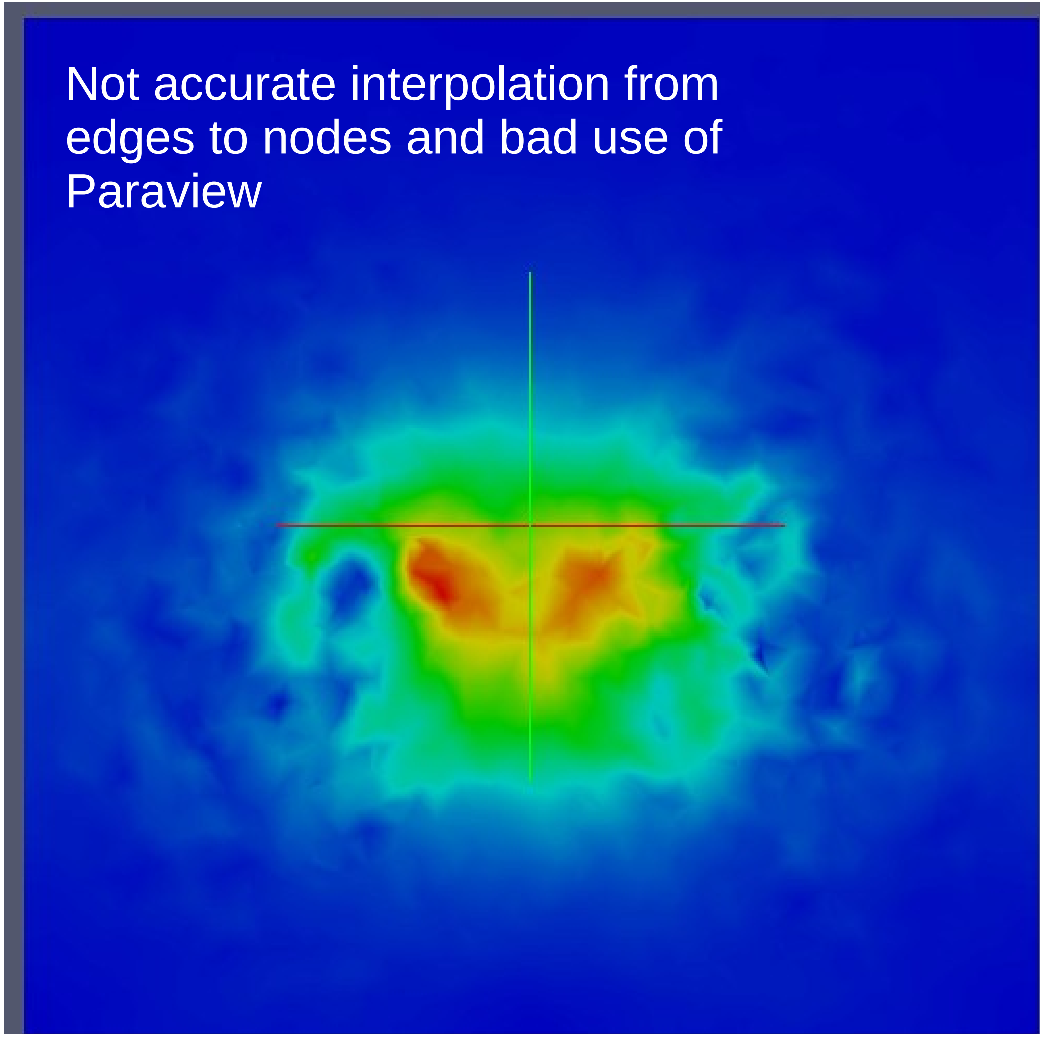
Simple, but not accurate!

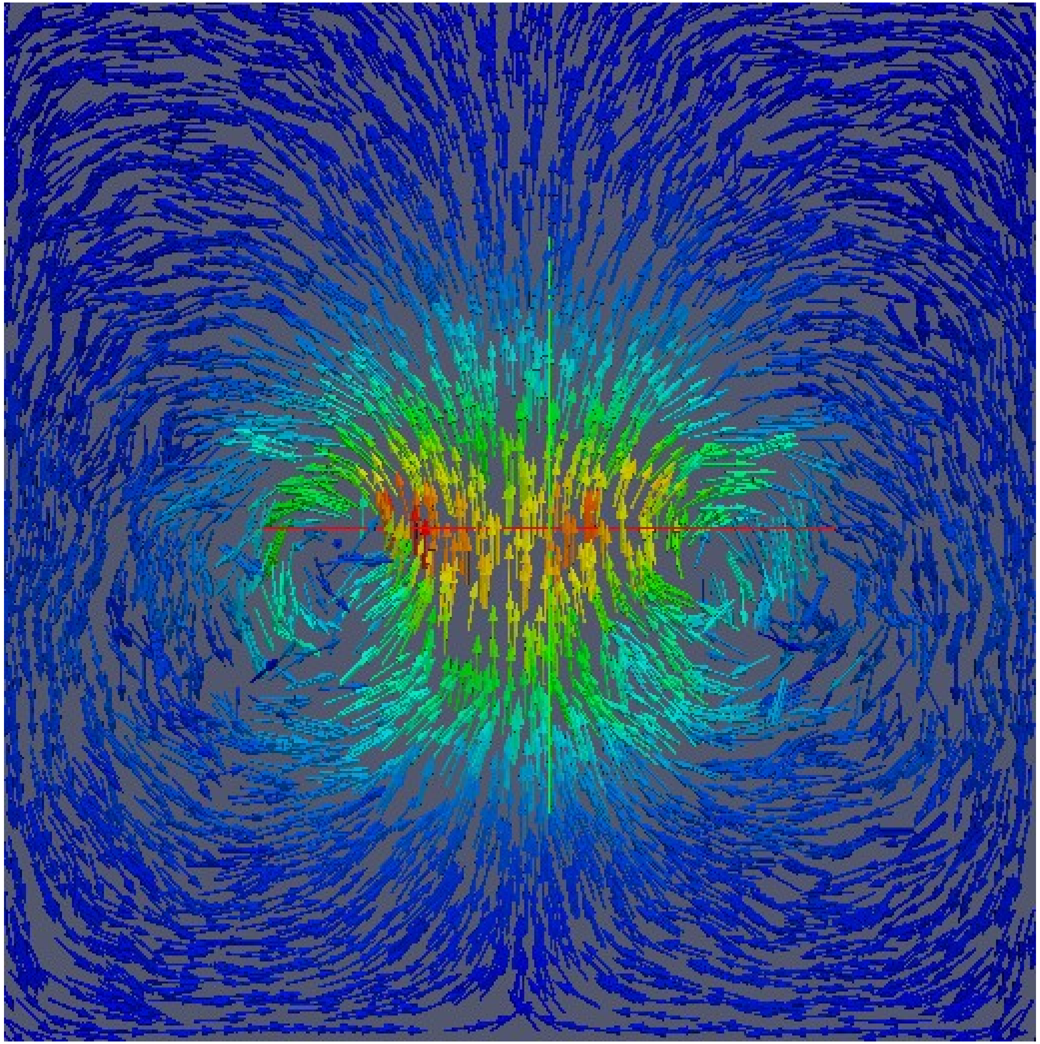
Solver draft: current ring over ferrite surface. Solution takes 800 iterations to converge to 2e-12. Mesh was not intended to be orthogonal





Solver draft: current ring over ferrite surface. B-field magnitude and vector





Ansys Maxwell 3D: Ring wire over ferrite surface