3D Modeling of the Magnetization of Superconducting Rectangular-Based Bulks and Tape Stacks

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Motivation
- 3D modeling not as mature as 2D
- Benchmarking & validation between different approaches necessary
- Investigation of magnetization of two geometries relevant for applications

Investigated problem
- Parallelepiped 10 mm x 10 mm x 1 mm
- External AC field in the xz plane, 200 mT, 30 degrees w.r.t. x, frequency 50 Hz
- Superconductor modeled as material with non-linear resistivity \( \rho(J) = \frac{\rho_c}{|J/J_c|^n} \)
- Stack represented by very large resistivity in the z direction
- Calculation of instantaneous power dissipation and magnetization cycles

Compared numerical models
- Minimum Electro-Magnetic Entropy Production (MEMEP) [1]
- H-formulation of Maxwell’s equations [2]
- Volume Integral Equation Method (VIM) [3]


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