

Pulsed Power Accelerator Design with COMSOL Multiphysics® Software

D. Reisman¹

¹Sandia National Laboratories, Albuquerque, NM, USA

Abstract

We have developed Thor: a pulsed power accelerator for performing dynamic material experiments. The design was aided by using the COMSOL Multiphysics® software with the AC/DC Module and RF Module. Our design process involved optimizing the impedance of the system while maintaining a good margin against electrical breakdown. By using a three-dimensional electromagnetic model of the entire power flow structure, we were able to obtain a design that efficiently coupled capacitor energy to the physics load. We will present our modeling results, which range from determining the inductance and electric fields of the central power flow section to the transient modeling of the input cables that deliver power to the accelerator.

Figures used in the abstract

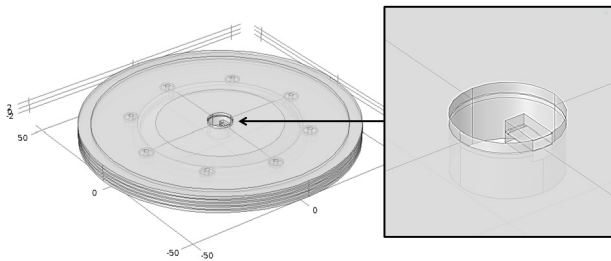


Figure 1: Central power flow section of Thor accelerator. Current is concentrated into the stripline load on the right.

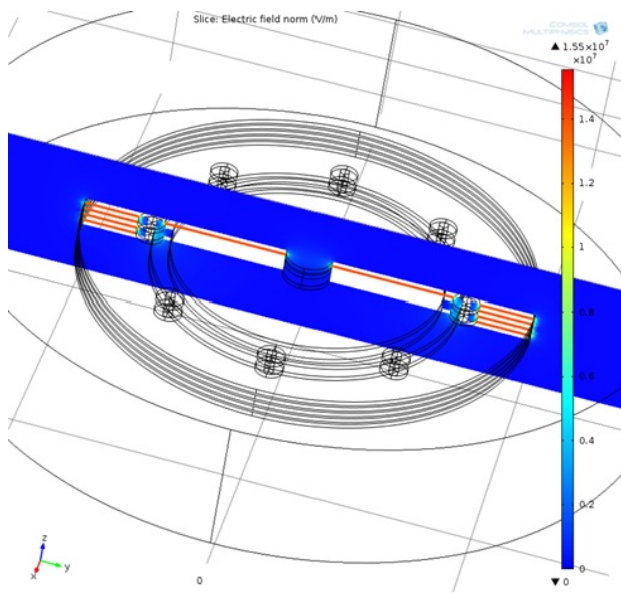


Figure 2: Calculation of electric fields in water convolute structure.

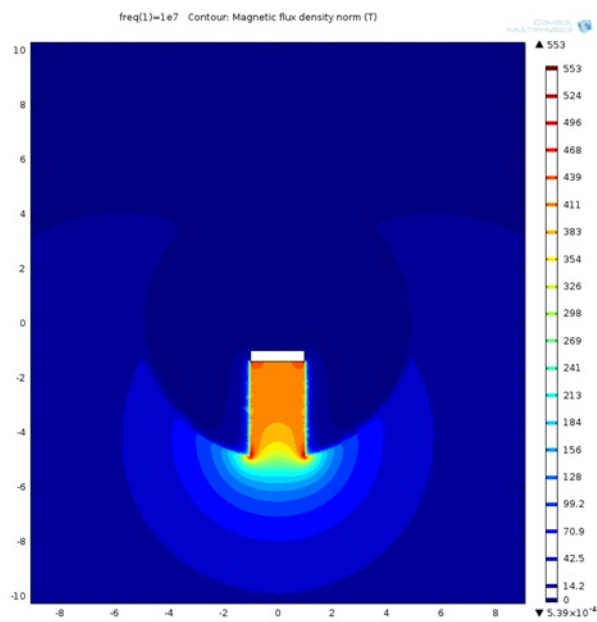


Figure 3: Calculation of magnetic fields in the stripline load.

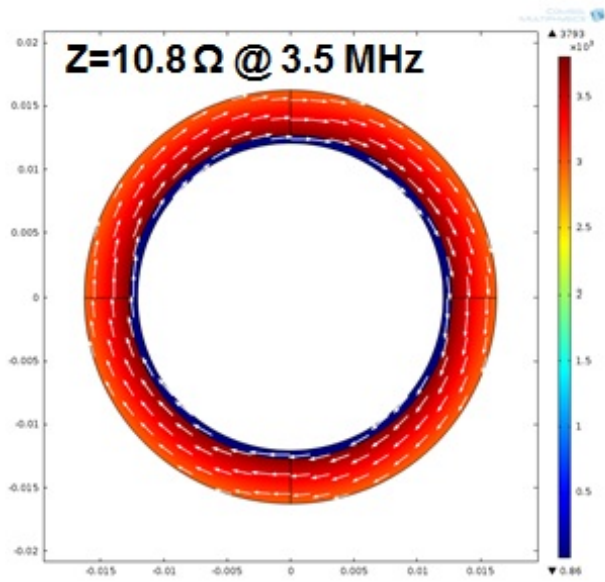


Figure 4: Calculation of impedance in cables used in Thor accelerator.