

Abstract Submitted
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A Computational Model for Predicting Gas Breakdown¹

ZACHARY GILL, Missouri Univ of Sci Tech — Pulsed-inductive discharges are a common method of producing a plasma. They provide a mechanism for quickly and efficiently generating a large volume of plasma for rapid use and are seen in applications including propulsion, fusion power, and high-power lasers. However, some common designs see a delayed response time due to the plasma forming when the magnitude of the magnetic field in the thruster is at a minimum. New designs are difficult to evaluate due to the amount of time needed to construct a new geometry and the high monetary cost of changing the power generation circuit. To more quickly evaluate new designs and better understand the shortcomings of existing designs, a computational model is developed. This model uses a modified single-electron model as the basis for a Mathematica code to determine how the energy distribution in a system changes with regards to time and location. By analyzing this energy distribution, the approximate time and location of initial plasma breakdown can be predicted. The results from this code are then compared to existing data to show its validity and shortcomings.

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