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Numerical Investigation of Plasma Detachment in Magnetic Nozzle Experiments[1] KAMESH SANKARAN, Whitworth University, KURT POLZIN, NASA Marshall Space Flight Center — There exists a need for a comprehensive model that describes plasma detachment from an externally-imposed magnetic nozzle. To make progress towards that end, plasma flow in a magnetic nozzle experiment was simulated using a multidimensional code that includes theoretical models of various dispersive and dissipative processes. The aim is to compare the computational results with various proposed detachment theories to estimate the importance of possible mechanisms. An applied magnetic field topology is created using a magnetostatic solver, and is then superimposed on the time-dependent magnetic field induced in the plasma to provide a self-consistent field description. The applied field model matches those found in actual experiments, thus making way for validating the computational results. In addition, comparison of the simulation results with the experimentally obtained plasma parameters will provide insight into mechanisms that lead to plasma detachment, revealing how they scale with different input parameters.

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