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MHD-LBM Simulations of Magnetic Field Effects on Axis-Switching and Instabilities in Rectangular Jets BENJAMIN RILEY, SHARATH GIRIMAJI, JACQUES RICHARD, Aerospace Engineering Department, Texas A&M University, College Station, TX 77843-3141 — Our objective is to assess the potential for flow control of plasma jets for space propulsion and high-altitude external flow applications. Toward this end, we study the effect of an externally applied magnetic field on rectangular plasma jets using a Magneto- hydrodynamic (MHD) Lattice Boltzmann flow solver. The Lattice Boltzmann Method (LBM) has been shown to be able to accurately capture axis-switching and instability onset in rectangular jets. We investigate the effects of varying magnetic field strengths and magnetic Reynolds numbers on entrainment, centerline velocity, instability onset, and the axis-switching phenomenon. Preliminary results indicate that the magnetic field has the following effects: (i) delays the instability onset; and (ii) inhibits the axis-switching phenomena. This study also seeks to develop more insight into the magnetic-velocity field interactions and investigate possible strategies for MHD flow control.

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