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MHD simulations of Plasma Jets and Plasma-surface interactions in Coaxial Plasma Accelerators VIVEK SUBRAMANIAM, LAXMINARAYAN RAJA, The University of Texas at Austin — Coaxial plasma accelerators belong to a class of electromagnetic acceleration devices which utilize a self-induced Lorentz force to accelerate magnetized thermal plasma to large velocities ($\sim$40 Km/s). The plasma jet generated as a result, due to its high energy density, can be used to mimic the plasma-surface interactions at the walls of thermonuclear fusion reactors during an Edge Localized Mode (ELM) disruption event. We present the development of a Magnetohydrodynamics (MHD) simulation tool to describe the plasma acceleration and jet formation processes in coaxial plasma accelerators. The MHD model is used to study the plasma-surface impact interaction generated by the impingement of the jet on a target material plate. The study will characterize the extreme conditions generated on the target material surface by resolving the magnetized shock boundary layer interaction and the viscous/thermal diffusion effects. Additionally, since the plasma accelerator is operated in vacuum conditions, a novel plasma-vacuum interface tracking algorithm is developed to simulate the expansion of the high density plasma into a vacuum background in a physically consistent manner.

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