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Motion of a Localized Region of High-Density Plasma across Magnetic Flux Surfaces[1] RAVI SAMTANEY, STEPHEN JARDIN, Princeton Plasma Physics Laboratory — Injecting small pellets of frozen hydrogen into a tokamak is a proven method of fueling. Previous results of 3D extended MHD simulations of pellets injection into tokamaks are in qualitative agreement with experiments, i.e., high-field-side (HFS) fueling is more efficient than low-field-side (LFS) fueling. A key issue is understanding the pellet-mass redistribution processes involving the density equilibrating along field lines and transport across surfaces (in the large-major-radius direction). At least two viewpoints exist: one is that the transport of mass across flux surface is accompanied by reconnection; while the other one suggests that the flow in the vicinity of the pellet is in the low-magnetic-Reynolds number regime so that high-density cloud simply slips through the magnetic field. In this talk , we present results from idealized simulations of the motion of localized regions of high-density plasma as they move across magnetic field lines and identify the mechanisms which are related to the motion of the ablated pellet mass across flux surfaces in a tokamak. The simulations are performed both in idealized Cartesian geometry and in tokamak geometry. The numerical method is based on generalized upwinding techniques. We employ the Chombo framework for adaptive mesh refinement to mitigate the need for large spatial resolution requirements.

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