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Global Energy Confinement Scaling Predictions for the Kinetically Stabilized Tandem Mirror JANE PRATT, WENDELL HORTON, University of Texas at Austin — We study transport dynamics in the axisymmetric kinetically stabilized tandem mirror (KSTM), an attractive magnetic confinement device for achieving steady-state fusion burning. For a MHD stable system, we investigate radial transport models using Bohm and ETG diffusion. Numerical coefficients in these models are taken consistent with tokamak and stellarator databases, providing a conservative radial transport estimate because of the well-known confinement improvement at high β as well as the absence of destabilizing toroidal curvature in a mirror machine. The plug mirrors create an ambipolar potential that controls end losses; radial losses are driven by drift wave turbulence, which lowers the electron temperature via ETG radial transport losses. Taking into account the Pastukhov energy and particle end losses, we analyze radial transport equations. For mirror ratio $R_m = 9$ and a large density ratio between plug and central cell regions, we use an ion potential of $\phi_i/T_i = 7.8$ for high axial confinement. Radial profiles, time profiles, and energy confinement times are calculated for a test reactor facility ($L = 30$ m, $B = 3$ T, $a = 1.5$ m). We study the conditions necessary for density and temperature to saturate, and investigate whether the dependence of electron radial transport on increasing electron temperature stabilizes the thermal instabilities reported in Hua and Fowler. Work supported by DOE grant DE-FG02-04ER54742.

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