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End Losses from a Magnetic Mirror: Kinetic Simulations and Guiding Center Theory[1] ARI LE, Los Alamos National Laboratory, JAN EGEDAL, CARY FOREST, U. Wisconsin-Madison, BILL DAUGHTON, ADAM STANIER, Los Alamos National Laboratory — Recent advances in high-temperature superconducting coil technology and very promising results from an experimental magnetic mirror machine [1] have renewed interest in magnetic mirror confinement concepts, and a new mirror device is being built at the University of Wisconsin-Madison. Using a set of kinetic simulations in the LANL particle-in-cell code VPIC [2], we study end losses from a magnetic mirror in the Gas-Dynamic Trap (GDT) [3] regime. GDT confinement depends sensitively on plasma collisions, which allow a thermalized population to develop in the GDTs central cell. We present 2D kinetic simulations including Coulomb collisions and injection of beams high-energy, low-collisionality sloshing fuel ions. The density profiles, electric field, heat losses, and particle distributions produced in the simulations agree favorably with a guiding center theory for the electrons and ions in the GDT exhaust. [1] P.A. Bagryansky et al., Physical review letters, 114, 205001 (2015). [2] K. J. Bowers, et al., Physics of Plasmas, 15, 055703 (2008). [3] V.V. Mirnov and D.D. Ryutov, Pis' ma v Zhurnal Tekhnicheskoj Fiziki, 5, 678-682 (1979).

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Ari Le
Los Alamos National Laboratory

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