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Improved kinetic modeling of Knudsen layer reduction of fusion reactivity B.J. ALBRIGHT, CHENGKUN HUANG, KEVIN J. BOWERS, KIM MOLVIG, ERIC M. NELSON, EVAN S. DODD, NELSON M. HOFFMAN, Los Alamos National Laboratory — Recent work by Molvig et al. [1] has led to renascent interest in the premise that fuel ions in tails of distribution functions in finite assemblies of thermonuclear fuel can be depleted by proximity to a boundary. This can lead to decreased fusion reactivity and yield in ICF capsules. In this presentation, the theory of Molvig et al. is reviewed, extended, and compared to kinetic particle-in-cell simulations employing a binary collision model between plasma particles and lossy walls that absorb tail ions, reinjecting them as a "core" Maxwellian. Inferred reaction rates as a function of temperature and distance from a boundary are obtained from the simulations and compared with those found from various theoretical models. It is found that the Molvig et al. "Knudsen distribution function" provides an upper bound to the modification to reactivity, but that a more complete theory is required to accurately obtain these loss effects.

[1] Kim Molvig et al., submitted to Physical Review Letters.

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