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DSMC Simulations Assessing the ES-BGK Kinetic Model for Gas-Phase Transport between Parallel Walls M.A. GALLIS, J.R. TORCZYNSKI, Sandia National Laboratories — Bird's Direct Simulation Monte Carlo (DSMC) method is used to simulate gas-phase diffusive transport at near-continuum conditions. The molecules collide using either the Boltzmann collision term or the ellipsoidal-statistical Bhatnagar-Gross-Krook (ES-BGK) kinetic model. Momentum, heat, and mass transport between parallel walls (i.e., Couette, Fourier, and Fickian flows) are investigated. The ES-BGK model produces values of the viscosity and the thermal conductivity outside the Knudsen layers that agree closely with the corresponding values from the Boltzmann collision term (also implemented in DSMC). However, the ES-BGK model produces less accurate values for the mass self-diffusivity, with a modest difference for the Maxwell interaction but a large difference for the hard-sphere interaction. Sandia National Laboratories is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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