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Viscous Heating in Nanoscale Shear Driven Flows BOHUNG KIM, ALI BESKOK, Old Dominion University — Three-dimensional Molecular Dynamics (MD) simulations of heat and momentum transport in liquid Argon filled shear-driven nano-channels are performed using 6-12 Lennard-Jones potential interactions. Work done by the viscous stresses heats the fluid, which is dissipated through the channel walls, maintained at isothermal conditions via a recently developed interactive thermal wall model. Momentum transport in shear driven nano-flow is investigated as a function of the surface wettability ($\varepsilon_{wf}/\varepsilon$), spatial variations in the fluid density, kinematic viscosity, shear- and energy dissipation rates are presented. Temperature profiles in the nano-channel are obtained as a function of the surface wettability, shear rate and the intermolecular stiffness of wall molecules. The energy dissipation rate is almost a constant for $\varepsilon_{wf}/\varepsilon < 0.6$, which results in parabolic temperature profiles in the domain with temperature jumps due to the well known Kapitza resistance at the liquid/solid interfaces. Using the energy dissipation rates predicted by MD simulations and the continuum energy equation subjected to the temperature jump boundary conditions developed in [Kim et al., *Journal of Chemical Physics*, 129, 174701, 2008], we obtain analytical solutions for the temperature profiles, which agree well with the MD results.

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