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Effect of surface roughness on a shear dependent slip flow of simple fluids NIKOLAI PRIEZJEV, Dept. Mechanical Engineering, Michigan State University — The behavior of the slip length in a flow of simple fluids subject to a constant force is investigated using molecular dynamics simulations. A nonlinear shear rate dependence of the slip length is observed for the weak surface attraction and incommensurable structures of the liquid/solid interface. A variation of the wall-fluid interaction potential produces a gradual transition in the functional dependence of the slip length on the shear rate. Thermal roughness of the wall atoms is found to modify the slip behavior and, in the case of large spring stiffness, the slip length is increased by a constant value in a range of accessible shear rates. Periodically and randomly corrugated surfaces strongly suppress shear rate dependence of the slip length even for a weak wall-fluid attraction. A relation to recent slip flow experiments will be discussed.

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