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Water nano-hydrodynamics: The interplay between interfacial viscosity, slip and chemistry HSIANG-CHIH CHIU, School of Physics, Georgia Institute of Technology, DEBORAH ORTIZ-YOUNG, School of Chemistry, Georgia Institute of Technology, ELISA RIEDO, School of Physics, Georgia Institute of Technology — The understanding and the ability to manipulate fluids at the nanoscale is a matter of continuously growing scientific and technological interest. Fluid flow in nano-confined geometries is relevant for biology, polymer science and geophysics. The applications range from gene sequencing to protein segregation, cell sorting, sensors, nanotribology and diffusion through porous media. Here, we present experiments which show how the interfacial viscosity of water strongly depends on the wetting properties of the confining surfaces. This dependence is fully explained by considering water slippage at the stationary solid surface. The interfacial viscous forces as a function of six surfaces with different wettability are fitted with a modified form of the Newtonian definition of viscosity, which takes into consideration the fluid slip. This simple relationship can explain the viscosity measurements and permits us to extract a "slip parameter" for each investigated surface. This slip parameter is found to increase with the static contact angle of the solid surface as expected from previous work, bringing clear evidence of the relationship between viscosity and slip.

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