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Boundary condition in liquid thin films revealed through the thermal fluctuations of their free surfaces BASILE POTTIER[1], LAURENCE TALINI, CHRISTIAN FRTIGNY, SIMM — We investigate the properties of liquids confined at nanometric scales from a solid wall with a new noninvasive technique. The optical technique used consists of measuring the height of fluctuations of the free surface, using the reflection of a laser beam on that surface. We hence measure the spontaneous thermal fluctuations of the free surfaces of liquids to probe their hydrodynamic boundary condition at a solid wall. The surface fluctuations of a silicon oil film could be described with a no-slip boundary condition for film thicknesses down to 20 nm. Oppositely, a 4 nm negative slip length had to be introduced to describe the behavior of n-hexadecane, consistently with previous surface force apparatus data on the same system. Our results demonstrate that at vanishing flow, a nanometric solid-like layer close to the wall may exist according to the nature of the liquid.

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