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**Study of liquid flows over solid surfaces by particle nanovelocimetry**[1] CEDRIC BOUZIGUES, PATRICK TABELING, CNRS UMR 7083 ESPCI, CNRS UMR 7083 ESPCI TEAM — In nanometric flows, interactions of the liquid with the surface become important. However, only indirect measurements of the slip length or the Debye length have been yet performed. Here we used near-field imaging of nanoparticles to observe water flows over solid surfaces. Water containing fluorescent nanoparticles was driven in microchannels and illuminated by an evanescent wave. Three-dimensional positioning of tracers allows the reconstruction of particle concentration and diffusion coefficient and of flow speed with 30 nm accuracy from 20 to 300 nm over the surface. We probed energy landscape over the surface which allows the first local *in situ* determination of surface potential and Debye length. We moreover directly measured slip length $L_s$. On hydrophilic surfaces, slippage is negligible but on smooth hydrophobic surface $L_s$=29+/-10 nm. This constitutes the first direct observation of slippage in a water flow. Altogether our results provide a novel insight into the behavior of fluids close of solid surfaces. The application of the tools we developed could be extended to study of composite surfaces and electro-osmotic flows.

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