

Abstract Submitted
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Stick or Slip? Slippery Questions of Boundary Question in Fluid Dynamics¹ STEVE GRANICK, Univ. of Illinois — Fluid dynamics within small channels draws great interest due to its fundamental interest on the one hand, and the development of microfluidic devices on the practical side, yet detailed knowledge about flow immediately at a solid surface remains too vague. Some experiments were previously performed in which hydrodynamic flow was compared to predictions using the classical stick boundary condition point to a certain amount of slip, but those measurements (from our own laboratory as well as others) suffered from the deficiency that the slip is inferred indirectly. Seeking to remedy this deficiency, this laboratory has undertaken experiments to measure the near-surface flow rate from direct measurement. Previous attempts to measure surface flow rate were limited to a resolution of the optical wavelength. Here, using fluorescence resonance energy transfer (FRET) and fluorescence quenching approaches, we improve the resolution by 1-2 orders of magnitude. Two different flow systems, hydrodynamic flow and electrokinetic flow, were investigated using this novel technique.

¹Experiments performed in collaboration with Dr. Sung Chul Bae, Dr. Yingxi Zhu, and Stephen Anthony.

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