

# Dynamic Characterization of Permeabilities and Flows in Microchannels

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**Abstract—** We make an analytical study of the nonsteady flow of Newtonian fluids in microchannels. We consider the slip boundary condition at the solid walls with Navier hypothesis and calculate the dynamic permeability, which gives the system's response to dynamic pressure gradients. We find a scaling relation in the absence of slip that is broken in its presence. We discuss how this might be useful to experimentally determine—by means of microparticle image velocimetry technology—whether slip exists or not in a system, the value of the slip length, and the validity of Navier hypothesis in dynamic situations.

**Index Terms—**

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