

Onsager Principle and Hydrodynamics in

the Nanoscale

It may come as a surprise to most scientists that up until recently, continuum hydrodynamics can not yield accurate predictions for fluids flow at the nanoscale. The problem lies not in the Navier Stokes (NS) equation, which expresses momentum balance and therefore must be valid, but in the boundary condition at the fluid-solid interface, required for the solution of the NS equation. Traditionally the no-slip boundary condition (NSBC) has always been used to solve hydrodynamic problems, which states that there can be no relative motion at the fluid-solid interface. The purpose of this talk is to delineate the problem and to present its resolution through the application of Onsager principle of minimum energy dissipation, which underlies almost all the linear response phenomena in dissipative systems [1-4].

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