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Title:

# Many-body hydrodynamic interactions in a microchannel

Abstract:

We introduce a novel and precise method for computing many-body hydrodynamic interactions in a cylindrical microchannel. The method is generic in the sense that we can easily change the radius and the character of particles hard spheres, droplets, permeable spheres, etc. These features are not available in any of the existing methods. Comparison with the available results validates our method. In particular we obtain excellent agreement with the analytically known expression for the single particle friction coefficient. Additionally we observe negative hydrodynamic coupling for finite particles which are consistent with the recently reported effect for point particles. As an example we compute the velocities of polymeric chains of particles in parabolic flow and compare them to unbounded space. The method will be helpful in the understanding of physical and physicochemical processes in a wide range of biological, geophysical, and microfluidic systems [1].

[1] Marcin Kędzierski and Eligiusz Wajnryb, Precise multipole method for calculating many-body hydrodynamic interactions in a microchannel, J.Chem. Phys. 133 (2010) 154105-1,11