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Dynamical Density Functional Theory and Hydrodynamic Interactions in Confined Systems[1] BENJAMIN GODDARD, University of Edinburgh, SERAFIM KALLIADASIS, ANDREAS NOLD, Imperial College London — Colloidal systems consist of nano-micrometer sized particles suspended in a bath of many more, much smaller and much lighter particles. When the colloidal particles move through the bath, e.g. when driven by external forces such as gravity, flows are induced in the bath. These flows in turn impart forces on the colloid particles. These bath-mediated forces, known as Hydrodynamic Interactions (HI) strongly influence the dynamics of the colloid particles. This is particularly true in confined systems, in which the presence of walls substantially modifies the HI compared to unbounded geometries. For many-particle systems, the number of degrees of freedom prohibit a direct solution of the underlying stochastic equations and a reduced model is necessary. We model such systems through Dynamical Density Functional Theory (DDFT), the computational complexity of which is independent of the number of particles. We include both inter-particle and particle-wall HI, demonstrating both their combined and relative effects.

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