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Effect of external field on the spatial correlations of two trapped microspheres in the presence of a wall

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Abstract

One simple combination of particles which captures effect of hydrodynamic interactions consists of two trapped beads, immersed in fluid, each with a single degree of freedom, and fluctuating around its equilibrium positions. Given such a system in the presence of a flat boundary, we consider effect of an external velocity or temperature field on it. The external field drives the two beads system, out of equilibrium. We calculate beads' auto/cross correlations in the presence of external field, then investigate if these auto/cross correlations can be used to reveal the presence of a possible external field, and its nature. We find that the former question could be answered successfully, while the latter requires additional information or additional degrees of freedom accessible to the observer.

Keywords: Nonequilibrium correlations, Hydrodynamics interactions, Langevin equation, External field, Flat boundary

For full article, refer to the Persian section