Hydrodynamic interaction between two beads in the presence of a temperature gradient: Effect of correlation of beads' motion on the Soret effect

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Abstract

To study the effect of internal structure of molecules on the Soret effect, we probe consequences of exerting a temperature gradient to a suspension of one single particle inside the fluid. The particle is modeled as two microspheres, loosely connected with a spring between them, or each trapped with an optical tweezers. For the later case, we calculate the net force, that the two beads system exerts on its surrounding fluid, due to the a temperature gradient. This result, lets us calculate the corresponding Soret coefficient of the two beads system. We further correct these calculations, considering the temperature dependence of the surrounding fluid's viscosity.

Keywords: temperature gradient, Soret effect, colloidal solution, temperature dependence of the viscosity, hydrodynamic interactions, Langevin equation

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