Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Stochastic Interactions of Two Brownian Spheres in the Presence of Depletants MEHDI KARZAR-JEDDI, Department of Mechanical Engineering, University of Connecticut, Storrs, CT 06269-3139, REMCO TUINIER, DSM ChemTech; Van't Hoff Laboratory for Physical and Colloid Chemistry, Utrecht University, the Netherlands, TAKASHI TANIGUCHI, Graduate School of Engineering, Kyoto University, Katsura Campus, Nishikyo-ku, Kyoto 615-8510, Japan, TAI-HSI FAN, Department of Mechanical Engineering, University of Connecticut, Storrs, CT 06269-3139 — The pair interactions between hard spheres play an essential role in many processes such as macromolecular crowding, binding, self-assembly of particles, and many chemical and food processes. Here we focus on theoretical analysis of the long-time correlated stochastic motion of two hard spheres in a non-adsorbing polymer solution. The hard spheres are held by hypothetical optical traps. The pair mobility tenser is found using a two-layer approximation with pure solvent in the depletion zone surrounding the particle and uniform polymer solution elsewhere. The resulting mobility computed by the boundary integral analysis is used to define the level of thermal fluctuation. Results show how the mobility and the decay of displacement correlation functions modified by the polymer depletion effect. The attractive osmotic potential increases the auto-correlation of the pair particle motion, while reduces the cross-correlation of the particles. This work gives better understanding of the pair interactions in a suspension of non-adsorbing polymers as an essential step toward many-particle interactions.

Mehdi Karzar-Jeddi
Department of Mechanical Engineering,
University of Connecticut, Storrs, CT 06269-3139

Date submitted: 15 Nov 2013 Electronic form version 1.4