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Displacement and velocity correlation functions of magnetic particle chains undergoing Brownian dynamics YUK KWAN HO, MINGJIE ZHENG, KIN WAH YU, The Chinese University of Hong Kong — Brownian dynamics of physical systems has been studied for a long time since Einstein in 1905. In this work, we report the study of a magnetic particle chain in ferrofluid, with hydrodynamic interactions and harmonic interactions included, by using Rice method [1]. We will focus on the correlation functions and relaxation time of the chain. As qualitative account for the effect of system parameters, analytic solutions of the displacement and velocity correlation functions of a two-body system have been studied. In the case of an over-damped system, very long relaxation time for the displacement correlation function can be obtained from the analytic solutions. Moreover, the size dependence of the relaxation time is also studied numerically for moderate chain sizes.

[1] M. C. Wang and G. E. Uhlenbeck, Rev. Mod. Phys. **17**, 323 (1945).

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