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Dynamic electrorheological effects of rotating spheres: a self-consistent theory LEI SHEN, KIN WAH YU, Chinese University of HongKong, GUO QING GU, University of Shanghai for Science and Technology, China, JUN JUN XIAO, Chinese University of HongKong — We have corrected and extended the previous work done by T. K. Wan[1]. By solving self-consistent relaxation equations under coupled dipole approximation, we got the exact analysis solution for two rotating particles. Next, we derived three typical rotating configurations. Several comparisons have been done for interacting forces as well as the angular velocity dependence. Further more, we extended this two-particle model to a lattice model which contains infinite periodically arranged rotating particles. It has been examined by employing Ewald summation method. The rotational motion leads to a shift of the ground state of this electrorheological solid. The original bct(body-centered tetragonal) structure is no longer stable. By noticing that the behavior of our model is extremely similar to the electrorotation case [2], we studied the relations between these two models. The explicit associating expression has been found.

[1] Jones T. K. Wan, K. W. Yu, and G. Q. Gu. Phys. Rev. E, 6846 (2002). [2] C. K. Lo and K. W. Yu. Phys. Rev. E, 031501 (2001).

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