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Dynamic electrorheological effects due to rotational diffusion of microparticles HING-WA TSANG, HIU-CHING LEE, KIN-WAH YU, The Chinese University of Hong Kong — Electrorheological (ER) fluids possess a variety of technological applications. The strength of the ER effect is originated from the interaction between the polarized dielectric particles in ER fluids. Existing theories assume the particles are at rest, which fail to agree with experimental results. We suggested the rotational motion of suspended particles be taken into account to close up the discrepancy between theory and experiment [1]. In this work, we have examined the motion of rotational polarized dielectric particles subject to a random torque. The rotational motion of the particles leads to a redistribution of the polarization charge on the surface of the particles [1]. We show that both the ensembled averaged dipole moment and the mean-square value of the angular velocity depend on the correlation function of the angular velocity and the dipole moment in the transverse direction of the applied flied. Implications of the results on dynamic ER effects will be reported. [1] J. T. K. Wan, K. W. Yu, and G. Q. Gu, Phys. Rev. E 64, 061501 (2001).

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