

平成 18 年 8 月 24 日

応用物理学会北海道支部 会員各位

応用物理学会北海道支部

講演会のお知らせ

下記講演会を開催いたしますので、多数ご参加下さいますようご案内申し上げます。

演題：Origin of the reduced attracting force between a rotating particle and a stationary one

講師：J. P. Huang 氏 (Department of Physics, Fudan University 教授)

日時：平成 18 年 9 月 1 日 (金) 16:00 ~ 17:30

場所：北海道大学工学部物理工学系大会議室 (A-1-17)

主催：応用物理学会北海道支部

講演の要旨

The study of interparticle forces is important in many aspects of physics. For instance, if such forces are determined, the macroscopic structures of various physical systems may be determined. The interparticle forces between rotating particles are very important in the study of a variety of systems, e.g., colloidal suspensions including electrorheological fluids and magnetorheological suspensions, living cells suspensions, and so on, since the particles in these fluids may rotate under a shearing flow. Recently Tao and Lan [R. Tao and Y. C. Lan, Phys. Rev. E. 72, 041508 (2005)] experimentally reported that the rotation of a dielectric or metallic particle can reduce significantly the attracting interparticle force between the rotating particle and a stationary one in argon gas. Based on the Gu-Yu-Hui theory of relaxation [G. Q. Gu, K. W. Yu, and P. M. Hui, J. Chem. Phys. 116, 24 (2002)], we have developed a theory to account for the Tao-Lan observations explicitly. Excellent

agreement between the theoretical results and the Tao-Lan experimental data shows that the reduction is due to the effect of charge relaxation. We also show that the relaxation time of touching rotating particles can be accurately determined with the aid of the developed theory, for which, however, the well-known Maxwell-Wagner relaxation time is no longer valid. In this connection, we also theoretically show that it is possible to detect the relaxation time (and rotation speed) of rotating particles by studying their nonlinear alternating current susceptibilities.

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