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Temperature Measurement for Dust Particles in a GEC Reference Cell.[1] JIE KONG, KE QIAO, LORIN MATTHEWS, TRUELL HYDE, CASPER, Baylor University — The thermal motion of a dust particle levitated in a plasma chamber is similar to that described by Brownian motion in many ways. The primary differences between a dust particle in a plasma system and a free Brownian particle is that in addition to the random collisions between the dust particle and the neutral gas atoms, there are electric field fluctuations, dust charge fluctuations, and correlated motions from unwanted continuous signals originating within the plasma system itself. Correlated motion cannot be qualified as random motion, and therefore should not be included in a measurement of the dust temperature. In this presentation, we discuss how to separate random and coherent motion of a dust particle confined in a glass box within a GEC radio frequency reference cell. Dust particle fluctuation data are obtained experimentally and analyzed using the mean square displacement and other techniques, and temperatures obtained by various methods are compared.

[1]Air Force Office of Scientific Research (FA9550-12-1-0044)

Truell Hyde
CASPER, Baylor University

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