

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Intrinsic Charge Fluctuations of Dust in Plasmas Containing Multiply Charged Ions BABAK SHOTORBAN, The University of Alabama in Huntsville — A master equation, formulated for states of the charge of a grain in a plasma containing various kinds of singly or multiply charged ions (Shotorban, *Phys Plasmas*, 2014) is presented. From the master equation, a Fokker-Planck equation is derived through van Kampen's system-size expansion method. The derived Fokker-Planck equation has a Gaussian solution with a mean and variance governed by two initial-value differential equations involving the ions and electron attachment rates. Also, a Langevin equation, statistically equivalent to the Fokker-Planck equation, and a discrete stochastic method, statistically representing the master equation, are developed to model the grain charge fluctuations in time. Grain charging in a plasma containing electrons, protons, and alpha particles is considered as a test problem. It is shown that the Gaussian solution is in very good agreement with the master equation's solution obtained numerically for this problem.

Babak Shotorban
The University of Alabama in Huntsville

Date submitted: 10 Jul 2014

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