Abstract Submitted
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Theory and Simulation of a Nonlinear Fluid Model for Void Formation in Dusty Plasmas[1] C.S. NG, A. BHATTACHARJEE, Space Science Center, University of New Hampshire, S. HU, University of California at Irvine, Z.W. MA, The University of Iowa — We present new developments in the theory and numerical simulation of a recently proposed [Phys. Rev. Lett. 90, 075001 (2003)] nonlinear time-dependent fluid model for void formation in dusty plasmas, which has been observed recently in a number of experiments in laboratory as well as under microgravity conditions. A void is typically a small and stable centimeter-size region within the plasma that is completely free of dust particles and characterized by sharp boundaries. This model describes an initial instability caused by the ion drag, rapid nonlinear growth, and a nonlinear saturation mechanism that realizes a quasi-steady state with void. New simulations in 1D/2D, as well as 3D spherically symmetric cases, are performed based on a realistic ion drag force operator derived recently [S. Khrapak et al, Phys. Plasmas 12, 042308 (2005)]. Qualitative features of these simulations are similar to our previous results using a model ion drag force operator, and compare well with observations.

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