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A fully kinetic model of dust particle charging by contact with a thermal plasma ALEXANDER KLEPINGER, PRESTON POZDERAC, The Ohio State University, DAVID ROSE, Voss Scientific LLC, DOUGLASS SCHUMACHER, The Ohio State University — Dusty plasmas, which contain dust particles immersed in a thermal plasma, are important in a wide range of areas including fusion, planetary formation, hypersonic flight, and plasma machining. The dust particles accumulate charge from collisions by the surrounding plasma particles in a manner that is still not well understood. Orbital Motion Limited (OML) theory is a common explanatory tool but it ignores key aspects of the charging process. We have modeled dusty plasmas using a new, fully kinetic simulation based on the particle-in-cell code, LSP [D. Welch and D. Rose, *Comp. Phys. Comm.* **164**, 183-188 (2004)]. We find the equilibrium charge of the dust particle exceeds that predicted by OML by as much as a factor of four in the regime where the dust particle is smaller than the Debye length. Our simulations also capture aspects of the time evolution of the system that OML does not. We discuss these results and their origins and compare to various models and computational approaches.

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