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Development and Performance Tuning of the Dusty Plasma Simulation Code DEMON ROBERT JEFFERSON, MARK CIANCIOSA, EDWARD THOMAS, Auburn University — Dusty (complex) plasmas are found in a broad range of environments ranging from the largest nebula to the manufacturing of the smallest microchips. In these systems, charged micro particles are suspended in a background plasma. The mutual interaction between the microparticles and the plasmas, in particular, the exchange of charge and energy, leads to the emergence of new plasma behaviors. Numerical tools that complement experimental investigations can provide new insights into the complex behaviors of dusty plasmas. The newly developed DEMON (Dynamic Exploration of Microparticle clouds Optimized Numerically) code is a tool to simulate dusty plasmas using experimentally relevant parameters. DEMON is an adaptive time step 2D N-body simulation of a dusty plasma using the 4^{th} order Runge-Kutta method to solve the equations of motion. A main feature of DEMON is use of a modular force model made possible though the use of Object- Oriented programming techniques. A careful choice of physical constraints, allows the simulation of realistic plasma parameters. This presentation is discuss the capabilities, performance and results of the DEMON code.

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