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# NUMERICAL EXPERIMENTS IN STRONGLY COUPLED COMPLEX (DUSTY) PLASMAS

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**Abstract.** Complex (dusty) plasma is a suspension of micron-sized charged dust particles in a weakly ionized plasma with electrons, ions, and neutral atoms or molecules. Therein, dust particles acquire a few thousand electron charges by absorbing surrounding electrons and ions, and consequently interact with each other via a dynamically screened Coulomb potential while undergoing Brownian motion due primarily to frequent collisions with the neutral molecules. When the interaction potential energy between charged dust particles significantly exceeds their kinetic energy, they become strongly coupled and can form ordered structures comprising liquid and solid states. Since the motion of charged dust particles in complex (dusty) plasmas can be directly observed in real time by using a video camera, such systems have been generally regarded as a promising model system to study many phenomena occurring in solids, liquids and other strongly-coupled systems at the kinetic level, such as phase transitions, transport processes, and collective dynamics. Complex plasma physics has now grown into a mature research field with a very broad range of interdisciplinary facets.

In addition to usual experimental and theoretical study, computer simulation in complex plasma plays an important role in bridging experimental observations and theories and in understanding many interesting phenomena observed in laboratory. The present talk will focus on a class of computer simulations that are usually non-equilibrium ones with external perturbation and that mimic the real complex plasma experiments (i. e., numerical experiment). The simulation method, i. e., the so-called Brownian Dynamics methods, will be firstly reviewed and then examples, such as simulations of heat transfer and shock wave propagation, will be present.