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Molecular dynamics simulation of complex plasmas: interaction of nonlinear waves CELINE DURNIAK, DMITRY SAMSONOV, University of Liverpool — Complex plasmas consist of micron sized microspheres immersed into ordinary ion-electron plasmas. They exist in solid, liquid, gaseous states and exhibit a range of dynamic phenomena such as waves, solitons, phase transitions, heat transfer. These phenomena can be modelled in complex plasmas at the microscopic or "molecular" scale, which is almost impossible in ordinary solids and liquids. We simulate a monolayer complex plasma consisting of 3000 negatively-charged particles (or grains) with the help of molecular dynamics computer simulations. The equations of grain motion are solved using a 5^{th} order Runge Kutta method taking into account interaction of every grain with each other via a Yukawa potential. The grains are confined more strongly in the vertical direction than in the horizontal. After seeding the grains randomly the code is run until the equilibrium is reached as the grain kinetics energy reduces due to damping force equal to the neutral friction in the experiments and a monolayer crystal lattice is formed. Then we investigate interactions between nonlinear waves in a monolayer strongly coupled complex plasma moving in three dimensions. Different excitations are applied during a short time symmetrically on both sides of the lattice. Structural properties and nonlinear waves characteristics are examined as the pulses propagate across the complex plasma in opposite directions.

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