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Computational study of acoustic solitary waves in 2D complex plasma M.J. GAREE, T.E. SHERIDAN, Ohio Northern University — A one-dimensional, nonlinear model has been developed for dust-acoustic (DA) waves in a two-dimensional complex plasma. In our model, identical charged dust particles reside on a periodic triangular lattice with lattice constant a. These particles are constrained to move in one dimension, and interact with each other via a screened Coulomb force with Debye length λ_D. The model is used to compute the dependence of the DA wave speed on the screening parameter $\kappa = a/\lambda_D$. Computed wave speeds show excellent agreement with theoretical predictions, thereby verifying the model. Total energy is also conserved, as it should be. Localized velocity perturbations are found to evolve into compressive solitary waves and to propagate through the lattice with speeds greater than the DA wave speed. Rarefactive solitary waves are not observed. We intend to characterize overtaking collisions of solitary waves in this system to determine if the phase shift predicted by Korteweg–deVries (KdV) theory occurs, and to compare computed solitary wave widths, amplitudes and speeds to the scalings predicted for KdV solitons.

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