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Nonlinear waves in two-dimensional crystalline plasma T.E. SHERIDAN, Ohio Northern University, V. NOSENKO, J. GOREE, University of Iowa — Complex (dusty) plasma consists of negatively-charged microscopic particles suspended in normal electron–ion plasma. Under appropriate circumstances, monodisperse particles will form a two-dimensional crystal at the lower sheath edge of an rf discharge. The particles repel each other via a shielded Coulomb force (a Yukawa potential) and are confined by a radial parabolic well. A crystal with ≈ 5000 particles (8 μm diam.) was created for a neutral argon pressure of 3 mtorr. The Debye shielding parameter was $\kappa \sim 4$. Highly-nonlinear, planar compressive waves were launched by pushing all the particles in a rectangular region at the center of the crystal in the same direction using an 18 W green laser. Solitary waves were found to propagate in the forward direction at Mach numbers up to 1.5. Oscillatory shocks were seen to propagate in the backward direction after the laser was turned off. Rarefactive pulses, which are predicted theoretically, were not seen.

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