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Shocks in 2D Yukawa systems : thermodynamics and kinetic properties.[1] MICHAEL S. MURILLO, CMSE Department, MSU, MATHIEU MARCIANTE, Los Alamos National Laboratory — The study of shock propagation has become a common way to obtain statistical information on a medium, as one can relate properties of the undisturbed medium to the shock dynamics through the Rankine-Hugoniot relations. However, theoretical investigations of shock dynamics are often done through idealized fluid models, which neglect kinetic properties. In this poster we study the propagation of shock waves in plasmas at the particle level, using molecular dynamics simulations to model the propagation of stationary shock waves in a two-dimensional Yukawa plasma. Stationary shocks are generated by a piston moving at constant speed, and macroscopic thermodynamic quantities such as temperature and pressure are computed from statistical averages. This theoretical investigation comprises two parts. First, we present the thermodynamic equilibrium properties of Yukawa plasmas under shock dynamics. Next, we focus on the influence of the kinetic aspects of the plasma, showing how transport coefficients of fluid models are related to the microscopic dynamics in phase-space and apply it to the Yukawa plasma case.

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