Abstract Submitted
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Shock Waves in Dispersive Eulerian Fluids[1] MARK HOEFER, Mathematics, North Carolina State University — Shock waves in dispersive media with negligible dissipation are studied in the context of the compressible Euler equations with weak dispersion. Example fluids of this type include superfluids, shallow water flows, and ion-acoustic plasma. A characterization of one-dimensional dispersive shock waves (DSWs) will be presented. DSWs are sharply distinct from classical, dissipatively regularized shock waves both in terms of physical significance and mathematical description. Drawing on terminology from classical gas dynamics, jump conditions (shock loci and speeds) and admissibility criteria for the long time evolution of step-like initial data will be presented utilizing a nonlinear wave averaging technique. While entropy conditions determine admissible, dissipatively regularized shock waves, conservative, dispersive systems are time reversible and can exhibit positive or negative dispersion. The universal structure of weak shocks will be shown to depend solely upon the dispersion sign and pressure law. Large amplitude DSWs can exhibit novel effects such as cavitation and "implosion" yielding internal, multi-phase dynamics.

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