Abstract Submitted
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**Observation of dispersive shock waves, solitons, and their interactions in viscous fluid conduits**[1] DALTON ANDERSON, MICHELLE MAIDEN, University of Colorado Boulder, NICHOLAS LOWMAN, None, MARIKA SCHUBERT, MARK HOEFER, University of Colorado Boulder — Dispersive shock waves (DSWs) and solitons are fundamental structures in dispersive hydrodynamics, but studies have been severely constrained. Here we report on a novel testbed called the conduit system where one fluid is moved through another via a fluid pipe with virtually no mass diffusion. The interfacial dynamics of this pipe are conservative and are modeled by a scalar, nonlinear, dispersive wave equation, similar to those describing a superfluid. Resultantly, the interfacial waves are effectively dissipationless, which enables high fidelity observations of coherent phenomena such as large amplitude DSWs [1]. Experiments involving solitons, wavebreaking leading to DSWs, and their interactions will be presented. The results include the refraction and absorption of a soliton by a DSW and the refraction of a DSW by a second DSW, resulting in two-phase behavior. Excellent agreement between nonlinear wave averaging, numerics, and laboratory experiments will be presented. The nonlinear wave dynamics observed in this model system have implications for a broad range of other conservative dispersive hydrodynamic systems. Reference: [1] Maiden et al., PRL 116, 174501 (2016).

[1]NSF

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