

Abstract Submitted
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Nonlinear Dynamics of a Spring-Supported Piston in a Vibrated Liquid-Filled Housing: II. Experiments T.J. O'HERN, J.R. TORCZYNSKI, J.R. CLAUSEN, Sandia National Laboratories — The nonlinear dynamics of a piston supported by a spring in a vibrated liquid-filled housing is investigated experimentally. The housing containing the piston and the liquid is subjected to vibrations along its axis. A post fixed to the housing penetrates a hole through the piston and produces a flow resistance that depends on piston position. Flexible bellows attached to the housing ends enable the piston, liquid, and bellows to execute a collective motion that forces little liquid through the flow resistance. The low damping of this motion leads to a resonance, at which the flow-resistance nonlinearity produces a net force on the piston that can cause it to compress its spring. Experiments are performed to investigate the nonlinear dynamics of this system, and these results are compared to theoretical and numerical results. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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