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The Structure of Shock Waves in Liquids ROY BATY, CARL HAGELBERG, Los Alamos National Laboratory — This talk presents solutions of the Navier-Stokes equations that model shock waves in liquids, including water and mercury. One-dimensional jump functions are computed to describe the viscous microstructure of hydrodynamic shocks, which are not isentropic. Empirical equations of state in polynomial form are applied to the conservation laws to derive the physical flow microstructure for shock compressions and pressures up to 2.0 and 50.0 kbars, respectively. Traveling wave solutions are found for the Navier-Stokes equations by integrating the equations of motion along characteristic lines, where the shock wave jump functions are the solution of a two point boundary value problem. The empirical equations of state yield increasing shock wave jump functions for density and pressure. The solution method presented is applicable to arbitrary liquids that behave as Newtonian fluids for one-dimensional planar shock waves.

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