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Detonation and Transition to Detonation in Horizontal Water-Filled Pipes NEAL P. BITTER, JOSEPH E. SHEPHERD, California Institute of Technology — Detonations and deflagration-to-detonation transition (DDT) are experimentally studied in horizontal pipes which are partially filled with water. The gas layer above the water is stoichiometric hydrogen-oxygen at 1 bar. The detonation wave produces oblique shock waves in the water, which focus at the bottom of the pipe due to the curvature of the walls. This results in peak pressures at the bottom of the pipe that are 4-6 times greater than the peak detonation pressure. Such pressure amplification is measured for water depths of 0.25, 0.5, 0.75, 0.87, and 0.92 pipe diameters. Focusing of the oblique shock waves is studied further by measuring the circumferential variation of pressure when the water depth is 0.5 pipe diameters, and reasonable agreement with theoretical modeling is found. Failure of the detonation waves was not observed, even for water depths as high as 0.92 pipe diameters. Transition to detonation also occurred at every water height, and transition distance did not vary significantly with water height.

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