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An experimental study of shock wave reflection over non-Newtonian liquid wedges¹ HONGJOO JEON, CHRISTOPHER DOUGHERTY, RYAN MILLER, VERONICA ELIASSON, University of Southern California — An experimental investigation of the reflection of a planar shock wave over different density liquid wedges was performed by means of an angled shock tube. The goal is to find a transition criterion between regular reflection (RR) and irregular reflection (IR). The shock tube can be rotated to any angle between the horizontal and vertical planes for various impact media. The reflection of the oblique shock wave for different wedges was visualized using the shadowgraph and schlieren techniques. Previous research by Ben-Dor et al. (1987) conducted different types of reflecting solid conditions and Takayama et al. (1989) investigated a similar experiment with a nonsolid reflecting surface. Motivated by the previous work, we undertook a series of shock tube experiments where both Newtonian and non-Newtonian liquids were used to form a wedge for a shock wave to impact. Shear-thickening materials, such as a water-cornstarch mixture, or similar suspensions, could potentially be utilized to protect soldiers and other high-risk personnel from impacts. Results show that, for both a water-cornstarch and ballistic gelatin sample, the detachment angle at which the RR transitions to an IR was different from those of a solid and water.

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