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Determination of Detonation Wave Boundary Angles via Direct Numerical Simulations Using CREST NICHOLAS WHITWORTH, MATTHEW CHILDS, AWE Aldermaston — A key input parameter to Detonation Shock Dynamics models is the angle that the propagating detonation wave makes with the charge edge. This is commonly referred to as the boundary angle, and is a property of the explosive/confiner material combination. Such angles can be determined: (i) experimentally from measured detonation wave-shapes, (ii) theoretically, or (iii) via direct numerical simulations using a reactive burn model. Of these approaches: (i) is costly, (ii) breaks down for certain configurations, while (iii) requires a well validated model. In this paper, the CREST reactive burn model, which has previously been successful in modelling a wide range of explosive phenomena, is used to simulate recent Detonation Confinement Sandwich Tests conducted at LANL using the insensitve high explosive PBX 9502. Simulated detonation wave-shapes in PBX 9502 for a number of different confiner materials and combinations closely match those recorded from the experiments. Boundary angles were subsequently extracted from the simulated results via a wave-shape analysis toolkit. The results shown demonstrate the potential usefulness of CREST in determining detonation wave boundary angles for a range of explosive/confiner material combinations.

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