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Underwater Shock Response of Air-Backed Thin Aluminum Alloy Plates: An Experimental and Numerical Study[1] PENG REN, WEI ZHANG, Harbin Institute of Technology — Studies on dynamic response of structures subjected to underwater explosion shock loading are of interest to ship designers. Understanding the deformation and failure mechanism of simple structures plays an important role in designing of a reliable structure under this kind of loading. The objective of this combined experimental and numerical study is to analyze the deformation and failure characteristics of 5A06 aluminum alloy plates under underwater shock loading. Some non-explosive underwater blast loading experiments were carried out on air backed circular plates of 2mm thickness. The deformation history of the clamped circular plate was recorded using a high speed camera and the deflections of specimens at different radii were measured in order to identify deformation and failure modes. In the finite element simulations, the strength model of 5A06 aluminum alloy is considered using the slightly modified Johnson-cook mode to describe structure deformation. Good agreement between the numerical simulations and the experimental results is found. Detailed computational results of each scenario are offered to understand the deformation and failure mechanism.

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