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**Numerical and Theoretical Analysis of Plastic Response of 5A06
Aluminum Circular Plates Subjected to Underwater Explosion Loading¹**

PENG REN, WEI ZHANG, Harbin Institute of Technology — Dynamic response analysis of structures subjected to underwater explosion loading has been always an interesting field for researchers. Understanding the deformation and failure mechanism of simple structures plays an important role in an actual project under this kind of loading. In this paper, the deformation and failure characteristics of 5A06 aluminum circular plates were investigated computationally and theoretically. The computational study was based on a Johnson-cook material parameter mode which was obtained from several previous studies provides a good description of deformation and failure of 5A06 aluminum circular plates under underwater explosion loading. The deformation history of the clamped circular plate is recorded; the maximum deflection and the thickness reduction measurements of target plates at different radii were conducted. The computational approach provided insight into the relationship between the failure mechanism and the strength of impact wave, and a computing formulae for strain field of the specimen was derived based on the same volume principle and rigid-plastic assumption. The simulation and theoretical calculation results are in good agreement with the experiments results.

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