A Study of Effect of Surface Coating on Underwater Vehicle Structure Subjected to Shock Loading

E-mail: 9419585@ mail.dyu.edu.tw

ABSTRACT

The dynamic response of a vehicle structure to an underwater explosion is a complex problem due to the interaction between the fluid and structure. In the past, extensive research was conducted in the field of underwater shock to better understand the effects of blast damage on shock hardening of a structure. The study has involved both physical testing and numerical modeling of uncoated metal cylinders of various configurations such as unstiffened, stiffened, single shell layer and double shell layer models. Ship shock qualifications and even small scale testing can be cost prohibitive and time consuming, therefore mach of the work focus on developing computer models using numerical analysis techniques. The objective of this thesis was to examine the response of a metal rectangular plate and a metal cylinder coated with the rubber which included , when subjected to an underwater explosion, utilizing a numerical analysis technique. Rubber coated rectangular plates and cylinders were analyzed and parametric study of various coating included different material properties and thickness were performed to gain a better understanding of the coating effect on the vehicle structure. The results of this thesis indicate that the thickness of the coating is a critical factor to the shock hardening of the coated structures.

Keywords : underwater shock, shock qualifications, coated

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