A Study on Water Barrier for Ship Self-Defense A study on water barrier for chip self-defense

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ABSTRACT

The U.S. Naval Surface Warfare Center Dahlgren Division (NSWCDD) is developing technology for a concept that has the potential to be very effective in defending Navy platforms against high speed, sea-skimming, anti-ship cruise missiles (ASCMs). This concept uses a new kill mechanism, a wall of water, to provide a low cost, universal terminal defense system for Navy ships. This wall of water or water barrier is formed from the shallow detonation of multiple underwater explosive charges. To support the development and evaluation of the Water Barrier Concept, underwater detonation tests of scaled line charges were conducted by NSWCDD in July 1995 to determine the amount of water ejected into the air by subsurface detonation of continuous and discrete line charges. The above-surface plumes were generated by the underwater detonation of composition C-4 demolition blocks that were configured into continuous line charges that were 30 to 56 feet in length. Plumes also were produced from the sequential underwater detonation of discrete line changes that consisted of five to eight 10-pounds charges separated by 8 feet and fabricated from C-4 demolition blocks. Line charge depths and horizontal separation of discrete charges were chosen to maximize the amount of water ejected into the air. This project will study the validation of the mathematic model and computational code for predicting shallow depth explosion plume behavior and compared with the NSWCCD underwater detonation tests in detail. The model is based on a generalized formulation of hydrodynamics and uses an incompressible liquid assumption. This model will be validated by comparing a three-dimensional (3-D) computation to observations from NSWCDD experiments. Quantitative measurements of plume heights, diameters and plume profiles are also compared to the computational data by using 3-D model of discrete line charge, and 2-D models of continuous and discrete line charge. Finally, the explosive configuration studies based on computations of 2-D and 3-D line charges will be studied of producing an effective plume profiles.

Keywords : Anti-ship cruise missiles (ASCMs) ; barrier ; plume ; line charge

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