ANALYSIS OF BLAST SURVIVABILITY OF MINE HUNTER/KILLER SYSTEMS

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Results of a study of the survivability aspects of the Mine Hunter Killer (MH/K) system are reported. The study examined the threat to the MH/K system elements of accidental or deliberate detonation of antitank (AT) and antipersonnel (AP) mines and mine neutralization devices. Mine Hunter/Killer systems will operate in a minefield environment and will detonate various AT and AP mines at different distances from the system. System survivability during a mine clearing operation (which includes ensuring platform mobility and unimpeded sensor operation) is one of the most important factors in defining its efficiency. Current MH/K system concepts may require the MH/K system to detect mines at a close distance and to place the neutralization device in the vicinity of the mine. This mode of operation leads to additional risk of triggering a mine in very close proximity to the MH/K system, which increases the protection levels required for various MH/K systems' survivability.

We used high fidelity numerical simulation for analysis of blast wave parameters at different distances and for different mine neutralization scenarios. We developed and integrated a set of numerical tools that enable analysis of the mine blast, the blast interaction with complex three dimensional structures, and the structural response to blast loads. These codes (MPHASE, SOG2D, AUGUST3D, FELISA, GRIDTOOL, DYNA3D) have been validated for problems of explosives detonation and blast structure interaction and have been used for survivability analysis and for design of blast protective devices[1,2,3]. Use of these developed and validated analysis tools provided accurate assessment of MH/K system vulnerability in its designed mode of operation.

The current study reports results of numerical analysis of various mines and of mine neutralization equipment detonation scenarios. These results were obtained using simplified assumptions about the geometry of the area where the mines and the mine neutralization devices are detonated and of the surrounding environment. Use of these simplified assumptions allowed us to simulate a large number of MH/K operation scenarios using high accuracy two-dimensional simulations of blast waves created by the detonation of mines and of mine neutralization devices.