

Modelling Task Group Operations Across the Underwater and Above Water Domains

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Abstract

A naval Task Group (TG) commander must trade off considerations for countering underwater and above water threats when deciding on a TG disposition to protect a high value unit (HVU). TG dispositions to counter submarine threats typically involve escorts with active and passive sonar dispersed ahead of the HVU to form a protective barrier. Conversely, TG air defence against airborne threats, and in particular anti-ship missiles, involves positioning escorts much closer to the HVU. Physics-based engagement models are used in both the underwater and above water domains to help devise tactics, evaluate system performance, and provide inputs for employment of combat systems. These models rarely cover both domains given their unique and differing aspects for sensors, namely acoustics for underwater and radar/infrared for above water. Conversely, higher level operational analysis models offer broader scope, but with lower fidelity. Such a model, developed to investigate TG air defence, was recently used to explore modelling interactions across the two battlespace domains through extensions to include representations of underwater systems and performance. This paper presents an overview of the work conducted to achieve this. This initially involved introduction of acoustic sensors with simple detection models and depictions of TG dispositions for various underwater scenarios. The TG dispositions could then be studied in context of their ability to defend against an air or surface raid. The work has since evolved to explore embedding of sensor detection volumes produced from high fidelity models, and a framework to construct multi-ship tactics. The work is helping support tactics development for new capabilities being introduced by the Royal Canadian Navy through considerations of interactions across the underwater and above water battlespaces.

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