A Novel Approach to the Analysis of Sinking Ships; Combining Vulnerability, Stability and Escape & Evacuation Simulations

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Synopsis

At present naval ship ultimate stability, Escape & Evacuation (E&E) analysis and operator guidance are largely produced independently. Carpet plots are calculated quasi-statically giving estimates of vessel likelihood of survival using delineations of 'poor stability' and 'vessel lost' to the command whilst the definition of poor stability does not account for the dynamic effect of sea states on vessel motion. With advances in the software used to model threats and resultant ship damage effects, a new approach is proposed whereby abandonment and dynamic sinking are modelled alongside a functional survivability analysis. By integrating and automating survivability analysis with state-of-the-art E&E and seakeeping software, an ultimate stability carpet plot is produced giving times to sink based on time domain seakeeping simulations. In parallel, escape times can be generated including the effects of flooding and ship motions on movement of personnel which are then compared to the calculated sinking times. Through a combined consideration of threat, flooding and ship motions the escape arrangements of a vessel can be understood. It is possible to conduct this combined analysis in a cost and time efficient manner through the use of the tools developed as part of this work

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