

Multi-objective Hydrodynamic Optimization of the DTMB 5415 for Resistance and Seakeeping

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The paper presents recent research conducted by ITU team within the NATO RTO Task Group AVT-204 “Assess the Ability to Optimize Hull Forms of Sea Vehicles for Best Performance in a Sea Environment.” The objective is the improvement of the hydrodynamic performances (resistance/powering requirements, seakeeping, etc.) of naval vessels, by integration of computational methods used to generate, evaluate, and optimize hull-form variants. ITU uses a relatively simpler approach for obtaining design modifications (experimental space) and then employs an artificial neural network (ANN) as a metamodel of F1-F2 experimental area, to define the Pareto front and consequently identify the multi-objective solution. A multi-objective optimization of the DTMB 5415 (specifically the MARIN variant 5415M) is used as a test case and results obtained so far using low-fidelity solvers show an improvement for resistance and seakeeping performances of nearly 8 % and 12.5 %, respectively.