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Ballast Allocation Technique to Minimize Fuel Consumption

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Nowadays fuel consumption reduction is a primary concern in order to minimise operative costs and emissions during navigation. On this purpose, ballast management play an important role, in order to find the best configuration for ship navigation. An optimal ballast water distribution ensures to find a floating position having the minimum fuel consumption while assuring the fulfilment of rules requirements related to strength and stability. Since ships are operating also in adverse sea state condition, optimal ballast conditions should be found also for service conditions, considering the impact of added resistance due to waves on the propeller and consequently to fuel consumption. Within an emergency decision support system, an optimum ballast system has been developed satisfying the above mentioned requirements. In order to assess the optimal ballast allocation in a fast and accurate way, the equations are linearized and solved by means of pseudo inverse matrix. The target of this process is to find for a defined set of ballast tanks the level, or rather the volume, of water to reach the optimum floating position. The procedure has been tested on a reference ship and the results are here reported and described.

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