Impact mechanics of ship collisions and validations with experimental results - DTU Orbit (09/01/2019)

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Closed-form analytical solutions for the energy released for deforming and crushing of structures and the impact impulse during ship collisions were developed and published in Marine Structures in 1998 [1]. The proposed mathematical models have been used by many engineers and researchers although the methods were only validated with timedomain numerical simulation results at that time. Since then, model and full-scale measurements have been carried out and experimental results are available in the public domain. The purpose of the present paper is to use such experimental results to further analyze the validity and robustness of the closed-form analytical methods as well as to further improve some parameter's accuracy. In total, 60 experimental results have been analyzed and compared with the analytical results and this paper presents the outcome. It can be concluded that the analytical methods give a reasonable agreement with the experimental results. The paper also introduces a simple concept to account for the effective mass of liquids with free surface carried on board of a ship and it is shown how the analytical analysis procedure can be expanded to take into account the effect of ship roll on the energy released for crushing.

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