Effect of Buffer Bow Structure in Ship-Ship Collision - DTU Orbit (19/10/2019)

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A disastrous oil spill from a struck oil tanker has become one of the major problems in view of conservation of maritime environment. So far double hulls (D/H) have been introduced to reduce the consequences of collision and grounding events in order to further reduce the oil spill from struck oil tankers, the introduction of buffer bulbous bows has been proposed. Relatively soft buffer bows absorb part of the kinetic energy of the striking ship before penetrating the inner hull of the struck vessel. The purpose of the present paper is to verify the effectiveness of a prototype buffer bulbous bow structure in ship-ship collisions as compared with that of standard bulbous bows. This is demonstrated by conducting a series of large-scale finite element analyses. The finite element analyses are conducted with the general-purpose nonlinear structural code “LS-DYNA”. The applied scenario is one where a very large crude oil carrier (VLCC) in ballast condition collides with the midship region of a D/H VLCC in a laden condition. Fracture of fillet welds, elastic-plastic material properties and strain rate effects, are taken into account in the simulations. The effect of the equivalent failure strain (FS) and the forward velocity of the struck ship on the collapse mode of the bow of the striking vessel are investigated. Collapse modes, contact forces and energy absorption capabilities of the buffer bows are compared with those of conventional bows.

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