An Advanced Technology for Structural Crashworthiness Analysis of a Ship Colliding with an Ice-Ridge: Numerical Modelling and Experiments

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PII: S0734-743X(16)30932-0
DOI: 10.1016/j.ijimpeng.2017.02.014
Reference: IE 2850

To appear in: *International Journal of Impact Engineering*

Received date: 17 November 2016
Revised date: 7 January 2017
Accepted date: 21 February 2017

Please cite this article as: Serdar Turgut Ince , Ankush Kumar , DaeKyeom Park , JeomKee Paik , An Advanced Technology for Structural Crashworthiness Analysis of a Ship Colliding with an Ice-Ridge: Numerical Modelling and Experiments, *International Journal of Impact Engineering* (2017), doi: 10.1016/j.ijimpeng.2017.02.014

Highlights

- Nonlinear structural problems associated with a ship colliding with an ice-ridge are studied.
- Effects of buckling, collapse, crushing, plasticity and fracture together with environmental and operational factors, such as the loading speed (strain rate), temperature and salinity are taken into account.
- An advanced technology for numerical computations of structural crashworthiness in the event of a ship colliding with an ice-ridge is developed.
- The nonlinear finite element method is used for modelling the problem, in which the ship structures are modelled by plate-shell finite elements and the ice-ridge structures are modelled by solid elements together with the KOSORI ice material models.
- Two sets of experiments are performed to validate the numerical computations.
- It is concluded that the developed technology is very useful for computing the structural crashworthiness of a ship when colliding with an ice-ridge.