Real-time simulation of marine accidents and representation in a realistic, virtual environment may be an efficient way to train emergency procedures for ship's crews and thus improve safety at sea. However, although various fast, simplified methods have been presented over the past decades, the real-time simulation of ship grounding and collision events poses a number of challenges. This paper presents a set of theoretical models and methods by which it is relatively easy to implement collision and grounding modeling capabilities in existing, real-time marine simulators. Most notably, the paper co.... methods for fast prediction of collision and grounding motion and a method that transforms any motion into a set of forces. The latter method allows that the grounding and collision impact modules interact with the simulation software only through specification of external forces on the hull. The efficiency of the developed procedures is demonstrated by three examples: ship berthing (impact with quay), ship grounding on a pinnacle rock, and ship-to-ship collision. Although the paper specifically addresses ship impact problems, it is believed that a part of the presented methods would be advantageous to use in other types of time simulation where it is desirable to switch between direct time integration and some other known, stabilized solution, without a major redesign of the program architecture.

General information
State: Published
Organisations: Maritime Engineering, Department of Mechanical Engineering
Contributors: Simonsen, B. C.
Pages: 249-257
Publication date: 2003
Peer-reviewed: Yes

Publication information
Journal: Marine Technology
Volume: 40
Issue number: 4
ISSN (Print): 0025-3316
Ratings:
Scopus rating (2017): CiteScore 0.01 SJR 0.1
Scopus rating (2016): CiteScore 0.01 SJR 0.105
Scopus rating (2015): CiteScore 0.02 SJR 0.108 SNIP 0
Scopus rating (2014): CiteScore 0.03 SJR 0.109 SNIP 0
Scopus rating (2013): CiteScore 0.02 SJR 0.101 SNIP 1.481
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.24 SJR 0.168 SNIP 0.922
Web of Science (2012): Impact factor 0.125
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 0.43 SJR 0.287 SNIP 0.97
Web of Science (2011): Impact factor 0.419
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.235 SNIP 1.052
Web of Science (2010): Impact factor 0.292
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.21 SNIP 0.736
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.29 SNIP 0.381
Scopus rating (2007): SJR 0.332 SNIP 0.7
Scopus rating (2006): SJR 0.667 SNIP 1.236
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.262 SNIP 0.923
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.34 SNIP 0.482
Scopus rating (2003): SJR 0.362 SNIP 0.9