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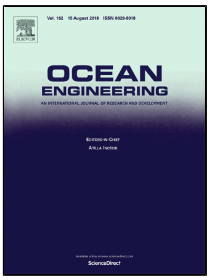

Assessing Ship Risk Model Applicability to Marine Autonomous Surface Ships

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Assessing Ship Risk Model Applicability to Marine Autonomous Surface Ships

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Marine Autonomous Surface Ships (MASS) are tested in public waters. A requirement for MASS to be operated is that they should be at least as safe as conventional ships. Hence, this paper investigates how far the current ship risk models for ship-ship collision, ship-structure collision, and groundings are applicable for risk assessment of MASS. Nine criteria derived from a systems engineering approach are used to assess the relevant ship risk models. These criteria aim at assessing relevant considerations for the operation of MASS, such as technical reliability, software performance, human-machine interfaces, operating, and several aspects of communication. From 64 assessed models, published since 2005, ten fulfilled six or more of these criteria. These models were investigated more closely. None of them are suitable to be directly used for risk assessment of MASS. However, they can be used as basis for developing relevant risk models for MASS, which especially need to consider the aspects of software and control algorithms and human-machine interaction.

Keywords: Marine autonomous surface ship, autonomous vessel, collision risk, allision risk, grounding risk

1. INTRODUCTION

Marine Autonomous Surface Ships (MASS) are becoming increasingly interesting for the commercial maritime sector as an alternative to conventional ships. Several research projects have investigated MASS concepts (e.g., ReVolt; (DNV-GL, 2015); Maritime Unmanned Navigation through Intelligence in Networks (MUNIN, 2012); Advanced Autonomous