A step towards risk-based decision support for ships - Evaluation of limit states using parallel system analysis - DTU Orbit (16/08/2019)

Onboard decision support systems (DSS) are used to increase the operational safety of ships. Ideally, DSS can estimate future ship responses within a time scale of the order of 1–3 h taking into account speed and course changes, assuming stationary sea states. In principle, the calculations depend on a large amount of operational and environmental parameters, which will be known only in the statistical sense. The present paper suggests a procedure to incorporate random variables and associated uncertainties in the calculations of the outcrossing rates that are the basis for risk-based DSS. The procedure is based on parallel system analysis, and the paper derives and describes the main ideas. The concept is illustrated by an example, where the limit state of a non-linear ship response is considered. The results from the parallel system analysis are in agreement with corresponding Monte Carlo simulations. However, the computational speed of the parallel system analysis proved slower than expected.