

Introduction

In general, seagoing vessels have to comply with the requirements of the IMO International code on Intact Stability (IS 2008). At this moment an additional set of stability criteria is under development at IMO, baptized the *Second generation intact stability criteria* (2nd gen.stab.crit.). Although it has not yet firmly been decided if or when these criteria will be implemented, it is expected that IMO will finalize the development around 2019, and that these criteria will be incorporated in IS 2008 part B (recommended criteria).

At this moment the structure of the 2nd gen.stab.crit. is rather established, so ship designers and shipyards may be evaluating their designs against these criteria. With two aims, in the first place to see whether their ship designs comply, and secondly to provide practical test cases to the national authorities or other IMO members.

The design and stability software of SARC, PIAS, will eventually be extended to include all relevant 2nd gen.stab.crit. evaluations. As first step some computation-intensive stability calculations in series of waves have been automated in PIAS. So, at SARC the framework and knowledge is available to offer their clients a *Second generation intact stability criteria scan* for their designs or ships, which is further elaborated in this document.



Short background and status of 2nd gen.stab.crit.

Five different stability failure cases are identified, which all have to be evaluated for a specific ship or design:

1. Parametric roll.
2. Pure loss of stability (on a wave top).
3. Surfriding and broaching.
4. Dead ship stability.
5. Excessive acceleration.

For each of these cases, three levels of assessment are available:

1. The first level is a simple test, which indicates whether this danger is actually present for a given ship design. If this test is passed, the second level test does not have to be evaluated.
2. The second level test comprises empirical estimations for all failure cases.
3. The third level is a direct stability assessment procedure (model tests or time domain simulations). However, this still has to be developed.

For all five failure cases the first level tests are well elaborated within the present set of proposals. Also most of the second level assessment methods are reasonably established, although it is not unthinkable that details or even the entire structure of sets of equations will change.

A nice introduction to the 2nd gen.stab.crit. can be found [here](#) (although this paper dates back to 2013, so some computation methods have been changed in the mean time).

Proposal for the ship-specific 2nd gen.stab.crit. scan

Given a ship design and an intact stability booklet, the scan consists of evaluating a number of loading conditions (with a maximum of 5) against those particular 2nd gen.stab. criteria which have reached a certain state of maturity:

- Parametric roll, first level, and second level (C1 factor only).
- Pure loss of stability, level one and two (however, the latter without the relaxation of wave height up to the highest 3%).
- Surfriding and broaching, first level.
- Dead ship stability, first level.
- Excessive acceleration, first level.

The deliverable will be a report with results and conclusions.

Assuming that all relevant ship data are available in PIAS format, the price for this scan will be € 1.800 (excluding VAT). If no PIAS files are available, on basis of a General Arrangement Plan we can offer a fixed fee for defining the relevant data.

Sharing results with authorities

It might be advantageous to share results with authorities. Being practical examples, they could be used for assessing or tuning the regulations, which are, after all, still in a concept phase. However, it is fully up to the discretion of the customer whether or not to share results with others. In The Netherlands a coordinating role for this matter is played by trade association Netherlands Maritime Technology (NMT). If required SARC can act as intermediary in this respect.

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