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Second Generation Intact Stability Criteria fallout on naval ships limiting KG curve

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Abstract. The International Maritime Organization (IMO) is working on the finalization of the Second Generation Intact Stability Criteria (SGISC) intended to be included in Part A of the 2008 International Code on Intact Stability in the following years. The SGISC consider five modes of dynamic stability failure in waves: parametric roll, pure loss of stability, surf riding/broaching to, dead ship condition and excessive acceleration. In this paper, a set of semi-displacement, round bilge and transom stern hull forms, i.e. typical naval hull forms, is examined in different loading conditions. Although naval ships are not directly impacted by SGISC, they are sensitive to dynamic stability failure phenomena due to their geometry and range of service speeds. A brief presentation of first and second vulnerability levels for parametric roll, pure loss of stability, dead ship condition and excessive acceleration failure modes is given, jointly with some remarks on the physical background. The procedure to assess vulnerability criteria has been implemented in Matlab©, referring to the latest drafts of the criteria (SDC 7/5, 2019). The limiting KG curves associated with this set of criteria have been obtained for the various condition of loading, for each vessel. The minimum allowable KG curve associated with the excessive acceleration criterion has been compared with the maximum allowable KG curve, to investigate the consistency of the safe operational area.

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