

THE DEVELOPMENT OF INTACT STABILITY CRITERIA: THE WORK ON SMALL SHIP UP TO 24 M OPERATE IN INDONESIAN WATERWAYS

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SUMMARY

Recently, the IMO 2008 Intact Stability (IS) Code has been widely used to ensure the safe operation of the ship by measuring ship stability level and other measures. This code contains stability criteria that applicable to the vessels with 24 m in length and above. The criteria has been adopted by Flag Administrator and as well as its Recognized Organization (RO). This 2008 IS code was developed since 1993, however, in some cases, the ships less than 24 meter (small ship) meet that their stability level are not complied with IS code stability criteria. It is assumed that is caused by differences of hull shape compared to typical large ship, and these make small ship more sensitive to its stability and seakeeping. Furthermore, it is needed to clarify the phenomena on the small ship. In this work, the seakeeping characteristics of small ship and its relate stability level will analyze. The number of small ship data are compiled and used in the numerical analysis to derive the stability level from its seakeeping performance. Thus, the results are compared with stability criteria of the reference's requirements.

Keywords : *Stability, Criteria, Small Vessel*

NOMENCLATURE

B	Breadth (m)
D	Depth (m)
f	Freeboard (m)
GM	Center of Gravity to Metacenter (m)
GZ	Righting arm (m)
Hs	Significant wave height (m)
LBP	Length between Perpendicular (m)
T	Draft (m)
Tp	Wave peak period (s)
Tr	Ship roll natural period (s)
VCG	Vertical distance of center of gravity (m)

1. INTRODUCTION

Stability may defined as a measure of the vessel's ability to get back on an even keel after having suffered a heel. It is determined by the characteristics of the vessel, such as hull form and weight distribution and how the vessel is operated. The stability of a small vessel is not a constant condition since they very sensitive to environment load such as wind and wave. Thus ship stability is one of primary parameter to be concerned since in design stage.

The safety problem of small vessels is a major issue across the world. Each year there is an average of 24,000 fatalities and 24 million non-fatal accidents [1]. In the period 2011-2015, almost 1,368 small vessels have been involved in 4,620 maritime accidents. 66% of total accident was counted as capsizing criteria that stability take over. This huge number accident lead to deep concern for maritime organization to develop specific standard for small vessel.

Number of criteria provided by ISO 12217-1 set some requirement which more relating to operating procedure rather than design engineering [2]. Meanwhile IMO/FAO gives more clear design standard for minimum stability performance [3]. Some flag administration has also develop their independent criteria instead of adopting from IMO. Other criterias may be imposed for novel design. Throughout the development of those code, in view of a wide variety of types, sizes of ships and their operating and environmental conditions, problems of safety against accidents related to stability have generally not yet been solved. Furthermore, design technology for modern ships is rapidly evolving and the Code should not remain static but be re-evaluated and revised, as necessary.

This study is working on development of small vessel stability criteria based on typical of the small vessel operating Indonesia and respect to environmental of Indonesia seaway. The result is compared to referenced criteria in order to know the applicability.

2. INTACT STABILITY CRITERIA

2.1 GENERAL CRITERIA

To ensure safety stability, some criteria has been introduced. The IMO (International Maritime Organization) has issued minimum stability criteria for different types of vessel and these criteria are taken into account at the vessel's design stage. IS Code 2008 criteria, also recalled on IMO res. A.749(18), which is applied for minimum requirement of ship with 24m length and over is commonly adopted by Flag