If non-linear responses are being considered should we use a non-linear wave input?

If so is 2nd order sufficient?

Do the committee think wave steepness of 1 in 25 be sufficient, given that in short-crested seas wave steepness above 1 in 5 can occur in deep water?

I.3. Discussion on the Report of the 23rd ITTC Specialist Committee on Prediction of Extreme Ship Motions and Capsizing: Design and operation of vessels to avoid capsize

By: Neil Bose, Memorial University of Newfoundland, Canada

The committee has worked on a very important subject. But I can’t help thinking that while it is important that we improve on modelling and accuracy of the actual capsize processes, what is much more important is how can we make ships that are less susceptible to capsize. Capsize of vessels nearly always results in loss of life. Has the work of the Committee led to the identification of factors that lead to capsize and ways in which the designs and operations of vessels can be improved to avoid capsize?

II. COMMITTEE REPLIES

II.1. Reply of the 23rd ITTC Specialist Committee on Prediction of Extreme Ship Motions and Capsizing to Günther F. Clauss

Thank you for your written contribution.

The Committee has conceded that additional tests using other ships in other scenarios, particularly for damage stability, would certainly add value to the benchmarking work already undertaken. This, however, does not imply that the selection of Ships A-1 and A-2 as well as their operational conditions are inappropriate. Ship A-1 was newly designed by a professional design office especially for this series of experiments to enable all hull design details to be published. Ship A-2 is a real ship currently operating in Asian Waters with a number of similar ships having sunk in waves. The loading conditions chosen are specified to marginally comply with the current IS Code. Although experiments were performed in regular, long-crested irregular and short-crested irregular waves, only regular waves were selected for the benchmark testing simply to ensure the maximum number of participating organisations.

Although the Committee appreciates Prof. Clauss’ invaluable data, it will be even more constructive and useful if he were to publish comparisons between his experiments and numerical simulation as time series in the near future. This could significantly contribute to further progress in numerical modelling towards practical use. Presenting information on encountering dangerous situations in following/quartering seas has been debated extensively in IMO in the past with a number of organisations presenting information during this debate in the form presented by the discusser. Moreover, based on the findings of studies and experiments aiming to identify and understand the associated problems guidance to master to avoid the postulated dangerous situations have been formulated.

Finally the Committee would like to remark that deterministic transient waves are useful to validate numerical models but are not appropriate to use for direct stability assessment itself as an alternative tool to the IS code.

This is because the occurrence probability of such waves cannot be evaluated and the direct stability assessment requires capsizing risk or capsizing probability to be compared with acceptable risk at the final stage.