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'Underkeel Clearance'

from J. A. Ewing

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I WOULD like to comment on the change in underkeel clearance due to the motion of a ship in a seaway (A. F. Dickson, this *Journal*, 20, 363).

Captain Dickson, in his conclusions, states that known techniques do not allow underkeel clearance to be calculated when ship motion is present. In fact there are a number of reliable ways of calculating the motions of a ship in waves (for example References (1) and (2), which treat the case of pitch and heave) which may help in this problem. These methods usually assume the ship is in deep water and is heading directly into the waves which are further assumed to be long-crested; but I believe it may also be possible to make reliable calculations for shallow-water effects and for waves which are, in reality, short-crested.

A knowledge of the directional spectrum of sea waves is needed for precise calculations of ship motions but this is not known in many situations. Useful results can, however, be obtained when only the wave height, period and direction are known either from wave measurements or from visual observations (for example Reference (3)).

There have been attempts to correlate model results and theoretical calculations with full-scale ship measurements and References (4) and (5) show the extent to which this has been achieved. Once a theoretical calculation method has been tested against results from full-scale measurements and is considered reliable then it is very much cheaper and faster to investigate a wide range of ship forms and sea conditions than would be possible from model test work or from the statistics of full-scale measurements.

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