

ESSENTIAL **SEAMANSHIP**2ND EDITION

4 3G E-LEARNING

ESSENTIAL SEAMANSHIP

2ND EDITION



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- 16. RINA Symposium (2001). Design and operation of bulk carriers post MV Derbyshire.
- 17. Tinsley, D. (2000). Preparing for the mammoth container ship. The Naval Architect. RINA.
- 18. Transportation Safety Board of Canada (2005), Marine Occurrences, Statistical Summary, Transportation Safety Board of Canada, Gatineau.
- 19. Wang, J., Pillay, A., Kwon, Y.S., Wall, A.D. and Loughran, C.G. (2005), "An analysis of fishing vessel accidents", Journal of Accident Analysis & Prevention, Vol. 37 No. 6, November, pp. 1019-24.
- 20. Yun, L. and Bliault, A. (2000). Theory and design of air cushion craft. Elsevier ButterworthHeinemann, Oxford, UK.

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