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# REVIEW

**Deep Water Gravity Waves (Weak Interaction Theory).** By BRUCE J. WEST. Lecture Notes in Physics, vol. 146. Springer, 1981. 341 pp. DM33.

The aim of this series of 'lecture notes' is, according to the publisher, to report 'new developments in physical research and teaching – quickly, informally and at a high level,' in which 'the timeliness of a manuscript is more important than its form, which may be unfinished or tentative'. This latter view may not be shared generally by the editors or by most contributors to this journal, since, fortunately, in most areas of fluid mechanics, the rush to establish priority is not so urgent that completeness and thoroughness must be sacrificed in the cause of rapid publication. Nevertheless, if the present volume is considered in the light of the avowed aim of the series, it is certainly successful and stimulating, if only to a rather narrow circle of readers.

The author limits himself to the ramifications of weak-interaction theory among surface gravity waves on deep water. It is the exploration of a particular process rather than any attempt to synthesize the results of this process with others, such as the strong nonlinear effects including wave breaking, to account for what is observed. It begins with a Hamiltonian development that is of considerable interest in that it avoids the usual Stokes expansion about the equilibrium level surface and the consequent difficulties of the classical approach in treating interactions among waves with widely disparate scales. The resonant interaction equations are derived, leading to a discussion of the envelope instabilities and the nonlinear Schrödinger equation. The Lagrangian formulation is discussed following Luke and extended to stochastic situations. Various steady-state special solutions are derived with stochastic equilibrium among just the resonant interactions with random input from the wind. Novel (for this field) and interesting entropy considerations lead to the evolution equation of Hasselmann and there is a brief discussion of the closure problem.

The book enjoys the strengths and suffers from the weaknesses one might expect of 'lecture notes'. It is informal and penetrating, leaving many avenues open to further study. At places, the reader is left to sort out omissions and errors. Figure 1.2 showing surface drift *vs.* fetch has no scales. On p. 28, the velocity field is represented as $\nabla\phi+\boldsymbol{\omega}$, where $\boldsymbol{\omega}$ is identified as the vorticity. Nevertheless, those readers who are capable of mastering the formalism will find much to interest them, but as the author says in his preface, the book 'may not be of immediate value to oceanographers' interested in the complex interplay of all processes occurring near the air–sea interface.

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