text is similar to that in other texts, but many figures are a bit better than usual. I especially appreciate the conceptual sketches that promote a more intuitive understanding of ocean science. For example, one classic figure shows the different amounts of sunlight intercepted by one square meter of Earth's surface at the equator and at the poles. Chamberlain and Dickey added thought bubbles indicating that the sun is high in the sky at the equator and low at the pole—this concept is more intuitive for students. Similarly, they provide a nice analogy between counting cars and measuring wave period, and a set of thermometers in different units marked with the temperature of the human body as well as the freezing and boiling points of water.

I have a few pet peeves about older textbooks. First, some texts present an obsolete taxonomy. Chamberlain and Dickey have an up-to-date taxonomy with a good discussion of the three domains and a nice comparison of relationships inferred from morphology and genetics (the brittle star gets reclassified). Second, the pervasive myth about toilets flushing backwards in Australia indicates a fundamental misunderstanding about the nature of the Coriolis force. Chamberlain and Dickey do mention the importance of scale in the Coriolis force, but do not specifically debunk the myth.

There is still some undue emphasis on California. Their conceptual sketch of tidal circulation, in which tides propagate along the coast (amphidromic circulation), is accurate for the West Coast of the United States; however, on the East Coast, the tide has a constant phase. My students on the East Coast deserve a more balanced treatment.

My students, and all students, deserve a chance to learn about how their lives touch the ocean, and they deserve a course that promotes critical thinking and inquiry-guided learning. It may be time for me to switch to a new text—by Chamberlain and Dickey.

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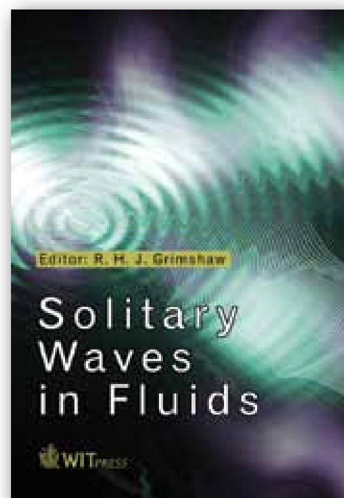
Solitary Waves in Fluids

Edited by R.H.J. Grimshaw, WIT Press, 2007, 208 pages, ISBN 9781845641573, Hardback, $130 US

REVIEWED BY QUANAN ZHENG AND R. DWI SUSANTO



It has been 160 years since the first recorded observation of a solitary water wave in a canal, which British scientist John Scott Russell saw while riding on horseback. Since then, many beautiful and applicable results of the physics and mathematics of solitary waves have appeared. Among them, several are noteworthy: the single soliton solution to the Korteweg-de Vries (KdV) equation (Korteweg and de Vries, 1895), the dnoidal solution (solitary wave packet) to the KdV equation (Gurevich and Pitaevskii, 1973), and analytical and numerical solutions to the perturbed and forced KdV (PKdV and fKdV) equations (Newell, 1985; Wu, 1987; Shen, 1993). Continuous emergence of fresh results in recent years suggests that it is still a brisk field.

The book *Solitary Waves in Fluids* edited by R.H.J. Grimshaw summarizes recent advances in the field. The book concentrates on describing the basic theories of solitary waves beginning with the earliest KdV equation, from which a single soliton solution is solved, to the latest nonlinear Schrödinger equation, from which an envelope solitary wave solution is solved. The book is divided into seven chapters; each chapter has its own references for readers who want to learn more about the topic. After Chapters 1 and 2 provide a historical introduction and the details behind the basic theory of the KdV equation, the subsequent five chapters explain its applications. Chapter 3 describes free-surface solitary waves in water and numerical methods to compute solitary waves. Chapters 4 and 5

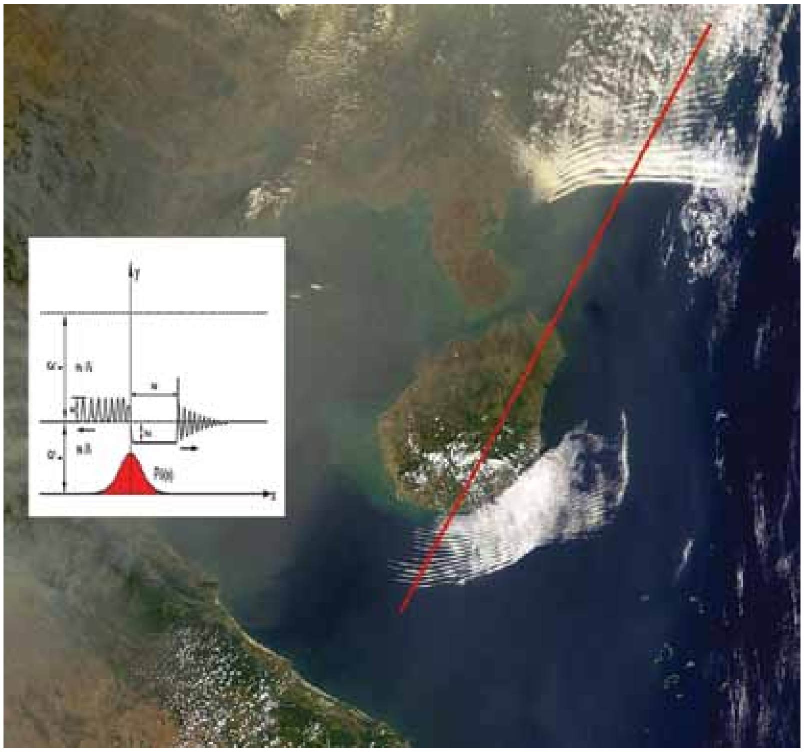


Figure 1. A true color SeaWiFS image taken on March 19, 1999. The waters of the northern South China Sea are dark blue. Two groups of wave clouds in white arrayed above and below Hainan Island are interpreted as signatures of upstream and downstream solitary wavetrains generated in the atmosphere by topographic disturbances. The red line represents the wind direction at 850 mb. At left is a physical model for the generation of forced waves in a two-layer flow with a bottom obstruction. The x- and y-axes represent the horizontal and vertical coordinates, respectively, and the curves represent an approximate solution of the fKdV equation.

discuss internal solitary waves in the coastal ocean and atmospheric boundary layer, and solitary waves in rotating fluids. Chapters 6 and 7 discuss planetary and envelope solitary waves.

Solitary Waves in Fluids provides readers with the methods and skills to solve equations and apply results to areas of the ocean and atmosphere with length scales from meters to thousands of kilometers. Indeed, the book meets its objective, to describe solitary waves on flows in a geophysical framework. This book is suitable for intermediate and advanced readers with backgrounds in fluid mechanics. *Solitary Waves in Fluids* explains the profound in simple terms, making it especially suitable for senior undergraduates and graduate students to use as a reference book. Although this book thoroughly covers theoretical solitary waves, to appeal to a broader audience, it should have included a few papers that concentrate on observational data. Having more examples of solitary waves observed in the real ocean and atmosphere using in situ and remote-sensing instrumentation would guide and motivate beginner and intermediate readers (e.g., Ramp et al., 2004; Zhao, 2004; Susanto et al., 2005; Zheng et al., 2007). Thus, we provide the following paragraph as a "suffix" to the book:

Earth observation technologies have also made tremendous advances compared with the "horseback sensing" used by the pioneer of solitary-wave science 160 years ago. In particular, the development of satellite remote-sensing technology since the 1960s has provided scientists and other users with excellent platforms from which to observe the atmosphere and ocean from space. Many previously unseen phenomena have shown up clearly on high-resolution satellite images. These phenomena include solitary waves in the atmosphere, such as the morning glory (Christie et al., 1978); island lee waves (Vachon et al., 1994); solitary wave packets in the lower atmosphere (Zheng et al., 1998); mountain waves (Eckermann and Preusse, 1999); and waves in the ocean, such as internal waves that appear as a single soliton and solitary-wave packet (Osborne and Burch, 1980; Liu et al., 1998; Zheng et al., 2001), and the collision of two internal solitary wave packets in the deep ocean (Zheng et al., 1995). These fresh observations have enriched our knowledge of solitary waves in fluids. Some of them have been used to verify theoretical solutions or predictions, and some have raised new questions. Figure 1 is an example of upstream and downstream solitary wavetrain coexistence in the atmosphere. The graph at left illustrates the physical model and its solution (Shen, 1993); the satellite image shows the evidence observed ten years later (Zheng et al., 2004).

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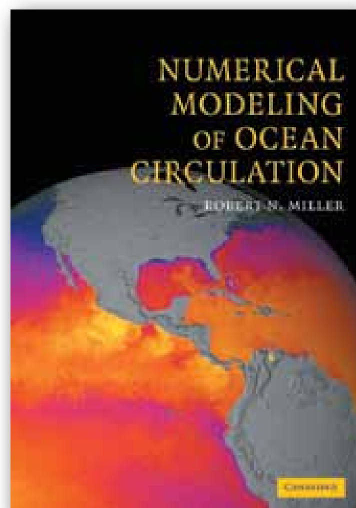
Numerical Modeling of Ocean Circulation



By Robert N. Miller, Cambridge University Press, 2007, 242 pages, ISBN 052178182, Hardcover, $65 US

REVIEWED BY ROBERT HALLBERG

Numerical ocean models have become increasingly valuable tools as we strive to understand the nature of the ocean's dynamics. They have progressed from the necessarily crude and idealized tools of decades past to capture much of the complexity and beauty of the real ocean. Many oceanographic research projects utilize numerical models as a fully equal partner and complement to the long-established physical oceanographic approaches of seagoing observational inference, theory, and fluids lab experimentation. As computers continue to increase in speed and availability at ever lower cost, this trend will clearly continue. Therefore, a solid background in knowing how to use numerical models to test hypotheses, when to trust their results and when not to, and how to relate the output of ocean models to observations has become an indispensable part of the education of an aspiring oceanographer.

Numerical Modeling of Ocean Circulation aims to fill this need as a text for preparing graduate students for modeling studies of large-scale physical ocean circulation. To quote from the preface, "this work is intended as a text. It is not intended to review the state of the ocean modeling art. Rather its aim is to provide the student with the context in which discussion of numerical modeling is conducted." To be read profitably, this book requires an introductory familiarity with geophysical fluid dynamics, consistent with the author's assumed