Book Review

“Physics of Tsunamis”, by B. W. Levin and M. A. Nosov, Second Edition, Springer, 2016; ISBN-10: 33-1933106X, ISBN-13: 978-331933-1065

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“Physics of Tsunamis”, second edition, provides a comprehensive analytical treatment of the hydrodynamics associated with the tsunami generation process. The book consists of seven chapters covering 388 pages. Because the subject matter within each chapter is distinct, an abstract appears at the beginning and references appear at the end of each chapter, rather than at the end of the book. Various topics of tsunami physics are examined largely from a theoretical perspective, although there is little information on how the physical descriptions are applied in numerical models.

Chapter 1 includes definitions and general information on tsunami monitoring, warning, and catalogs along with several interesting historical accounts. In the preface to the second edition, the authors indicate that an entire chapter on seaquakes was omitted that was included in the first edition, but interesting information on this phenomenon is still included within Chapter 1 of the second edition.

The bulk of this book, Chapters 2 through 4, concerns the generation of tsunami waves, in terms of both the physics of the solid earth and of the water column. Chapter 2 introduces the reader to the solid-earth physics of earthquakes related to tsunami generation, focusing on static deformation, rather than delving into earthquake mechanics or dynamic rupture propagation. Statistical analysis of various tsunami generation properties is provided, based on a catalog of earthquakes parameters and finite-fault models. Chapters 3 and 4 covers nearly half of the

book (174 pages), detailing aspects of incompressible and compressible hydrodynamics, respectively, of tsunami generation. Chapter 3 includes both a traditional description of hydrodynamics from static and kinematic sources, as well as an examination of residual hydrodynamic fields that accompany tsunami generation. Chapter 4 examines the role of compressibility during tsunami generation, a subject that the authors have published on extensively. A theoretical description of the subject is accompanied by an analysis of near-source bottom pressure records. This chapter ends with an interesting section on the nonlinear transfer of energy from high-frequency elastic oscillations to low-frequency surface gravity waves in the ocean.

The last three chapters of the book are short descriptions of a variety of subjects. Chapter 5 examines the physics of non-seismic sources: landslides, volcanoes, meteorological disturbances, and asteroids. Chapter 6 describes the basics of open-ocean tsunami propagation. Numerical models of tsunami propagation and the hydrodynamics of tsunami runup are also briefly addressed in Chapter 6, although more could be written about these subjects. Finally, Chapter 7 provides an interesting look at traditional and new methods to monitor and measure tsunamis.

“Physics of Tsunamis” fills an important niche in reference books on tsunamis. While there are several excellent and comprehensive texts on various aspects of tsunami propagation, few examine the hydrodynamics during generation. This book should especially appeal to those interested in an analytical treatment of near-source tsunami hydrodynamics.

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