

<<海岸水域表面波动力学>>

图书基本信息

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前言

Wave motion surrounds us—from the most secret, profound waves of quantum mechanics to the grand waves of the ocean surface. Ocean waves, or water waves, may be divided into deep- and shallow- water (coastal) waves. From an advance point of view, coastal waves are not studied as thoroughly as deep-water waves due to a complicated seabed topography on the former but not on the latter. Therefore, in conjunction with the effects of ubiquitous ambient currents, wave-current-bottom interactions make up the most fundamental, widespread dynamical mechanism in coastal waters manifesting itself as refraction, diffraction, scattering, and resonant wave interactions involved in energy exchanges. Apparently, it is essential to obtain a full, clear explanation and description of coastal waves for the development of broad offshore, coastal and harbor engineering, and also for having a better understanding of the evolutionary mechanism of deep-water waves. In fact, a commanding view on long-term investigating water waves is to wholly and uniformly treat and describe deep- and shallow-water waves, thus promoting the present rapid exploration and development of global oil and gas fields in deep waters of the oceans. The aforementioned views, ideas, judgments, all that I have thought and done over the last ten years, were compiled by me in this book. The book consists of nine chapters and appendices from A to H, depicting the fundamental paradigms of weakly nonlinear water waves.

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内容概要

Dynamics of Surface Waves in Coastal Waters Wave-Current-Bottom Interactions develops the typical basic theories (e.g. mild-slope equation and shorecrested waves) and applications of water wave propagation with an emphasis on wave-current-bottom interactions and Hamiltonian systems. In recent times, the interest in water wave propagation has accelerated because of rapid developments in global coastal ocean engineering.

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章节摘录

插图：The third term can be called the bottom wave action, a positive compensation by including the effects of moving bottoms and describing a widespread dynamic process occurring on the nearshore bottoms (such as coastal evolution and sand-wave migrations) . The fourth term may be considered as the dissipation wave action, transmitting a full scale effect of the dissipation arising from the origin in the viscosity of fluid, determining its nonnegligible dissipative function of the complete equation system, and probably having a widespread value of application. Finally the fifth term vanishes identically [2]. Therefore it can be seen that these four kinds of wave actions on the left of equation (7.4.2) reach mutually a more general form of integration with complement, compatibility and distinction. Bretherton and Garrett [2] had shown the equivalence of equation (7.4.1) for many other types of wave motion in fluid dynamics, so that, (7.4.2) can be regarded as a valuable extension of (7.4.1) , giving rise to a generalized wave action equation for the dissipative dynamical system in the nearshore region, which will play an important role in dealing with the process of real viscous flow.

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