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Nonlinear Dynamics in Ocean Engineering

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There is an increasing demand world wide on ocean engineering systems. The ability to predict and characterize the dynamic behavior of such systems before large financial commitments are made to their manufacture is an essential ingredient of contemporary engineering. Linear models often will not provide sufficient accuracy and reliability to analyze and predict the dynamics of the real system in a satisfying manner. Nonlinear effects have to be taken into account when setting up tools which support the design process. For example ship motions in rough sea, moored platforms and crane vessels under wave excitation show essentially nonlinear behavior. Unfortunately, these systems operate under certain conditions at the stability limit and this sometimes leads to serious accidents with loss of human lives and causing huge environmental pollutions. A future goal should be the optimization of ship design and ship as well as crane vessel operations such as the nonlinear dynamics is taken into account. In this sectional lecture the dynamics of floating ocean engineering structures is discussed in detail.

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