SEA LOADS ON DISPLACEMENT SHIPS AND OTHER LARGE-VOLUME STRUCTURES IN NON-SHALLOW WATER

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Linear, weakly, and strongly nonlinear sea load interaction with stationary large-volume structures and ships in transit in constant finite water depth are discussed. Error analysis is emphasized. State-of-the-art potential-flow methods do not consider the important wavelength change due to wave-current interaction in linear regular waves. This fact influences higher-order wave load predictions such as slowly varying motions of moored structures. CO_2 emission in ocean transport is modelled by a two-time scale method accounting for added resistance, propulsion, and engine dynamics in irregular waves. However, voluntary speed reduction plays a vital role in assessing CO_2 emission. Time efficient numerical methods for ship maneuvering in waves based on a two-time scale method with slowly varying maneuvering and rapidly varying linear seakeeping response need, e.g., accurate calculations of slowly varying wave-induced added resistance, transverse force, and yaw moment. Green water on deck and slamming are examples of strongly nonlinear hydrodynamic load effects. Slamming should be integrated with the structural response analysis and hydroelasticity may matter.