FSM4S_11912

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Slender Body Theory Approach to Nonlinear Ship Motions

Edwin J. Kreuzer, **Wolfgang M. Sichermann**

TUHH, Mechanics and Ocean Engineering, Hamburg, Germany

The accurate prediction of large amplitude ship motions poses still a delicate problem in the field of fluid-structure interaction. While three-dimensional panel methods have reached the state of maturity in linear seakeeping analysis, the original problem, governed by strongly nonlinear boundary conditions, is far from being solved efficiently. This paper presents a solution method for the time-domain investigation of nonlinear heave and pitch motions of ships in head seas. It is implied that the wave patterns around the ship are described sufficiently by potential flow. Further, the slender body assumption for ships is employed in order to decompose the three-dimensional flow problem into a series of consecutive two-dimensional problems where the nonlinear character is retained. The numerical integration of the ship motions is complicated by the impulsive character of the hydrodynamic forces so that special care has to be taken with respect to efficiency and stability of the integration scheme.

View the extended summary