Pseudo-impulsive solutions of the forward-speed diffraction problem using a high-order finite-difference method - DTU Orbit (07/11/2019)

This paper considers pseudo-impulsive numerical solutions to the forward-speed diffraction problem, as derived from classical linearized potential flow theory. Both head- and following-seas cases are treated. Fourth-order finite-difference approximations are applied on overlapping, boundary-fitted grids to obtain solutions using both the Neumann-Kelvin and the double-body flow linearizations of the problem. A method for computing the pseudo-impulsive incident wave forcing in finite water depth using the Fast Fourier Transform (FFT) is presented. The pseudo-impulsive scattering solution is then Fourier transformed into the frequency domain to obtain the wave excitation forces and the body motion response. The calculations are validated against reference solutions for a submerged circular cylinder and a submerged sphere. Calculations are also made for a modern bulk carrier, showing good agreement with experimental measurements.

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