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Fast Multipole Algorithm for Wave Response Analysis of Floating Structures

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The conventional Boundary Element Method (BEM) employing free-surface Green's function is practically impossible to be applied for large-scale analysis such as wave diffraction/radiation analysis for Very Large Floating Structures (VLFS) in general sea-bed topography. This is mainly due to $O(N^2)$ requirement for storage and $O(N^3)$ characteristics for CPU time, where N is the number of unknowns for the BEM. The Fast Multipole Algorithm (FMA) has thus been applied to the BEM utilizing the Green's function by the present authors. The method has $O(N)$ characteristics both for storage requirement and CPU time. The method has been applied to large-scale analysis such as wave response analysis of pontoon type VLFS in general sea-bed topography, and hybrid-type VLFS having complicated shape, where N is the order of 10^4-10^5.

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