

# Interaction of water waves with vertical cylinder using the method of fundamental solutions

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This paper proposes applications of the method of fundamental solutions (MFS) to solve the scattering of water waves by bottom-mounted vertical circular cylinder. By using the two-point function of fundamental solutions, the coefficients of influence matrices are easily determined. It is found that this method also produces irregular frequencies as well as the boundary element method does. The position of the irregular frequency depends on the source point location. To avoid this numerical instability, the mixed-layer potential method is employed to deal with the problem. Based on the circulant properties and degenerate kernels, an analytical scheme in the discrete system of a cylinder is achieved to demonstrate the existence of irregular frequencies. One numerical example of scattering problem of a circular cylinder was examined and are compared with the results by using direct BEM.

**Key Words:** method of fundamental solutions, water wave, two-point function, irregular frequency, circulant, degenerate kernels.