Explicit solution of the scattering problem involving a vertical flexible membrane

Srinivasa Rao Manam, Ashok Kumar, and Gunasundari Chandrasekar
Indian Institute of Technology, Mathematics, Chennai, India (manam@iitm.ac.in)

The problem of normally incident water wave scattering by a flexible membrane is completely solved. The physical problem in a half-plane is reduced to a couple of equivalent quarter-plane problems by allowing incident waves from either direction of the membrane. In the same way, quarter-plane boundary value problems are posed for solid wave potentials that are solutions of the scattering problem involving a rigid structure of the same geometric configuration. Then, two novel integral relations are introduced to establish a link between the required solution wave potentials and few resolvable solid wave potentials. Explicit expressions for the scattering quantities such as the reflection and the transmission wave amplitudes are obtained. Also, the deflection of the flexible vertical membrane and the solution potentials are determined analytically. Numerical results for the scattering quantities and the membrane deflection are presented.