

## **Application of mixed Eulerian-Lagrangian method in nonlinear wave-structure interactions**

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### **Abstract**

Mixed Eulerian-Lagrangian methods solve water wave problems by tracking the moving boundaries using Lagrangian method and obtaining the flow field using Eulerian method. One advantage of this type of methods is its ability to deal with highly nonlinear water waves. In this talk, a numerical implementation of mixed Eulerian-Lagrangian methods is used to develop a 2D numerical wave tank for studying wave-structure interactions. The numerical wave tank is used to investigate two problems: (1) nonlinear wave scattering by fixed horizontal plate and (2) wave transmission through a submerged heaving plate. For the first problem, the focus is on the reflection and transmission of fundamental waves, generation of free and phase-locked second harmonic waves. For the second problem, the focus is on the transmission reduction of the fundamental and higher harmonic waves by the destructive interference between the radiated waves and the transmitted waves.