

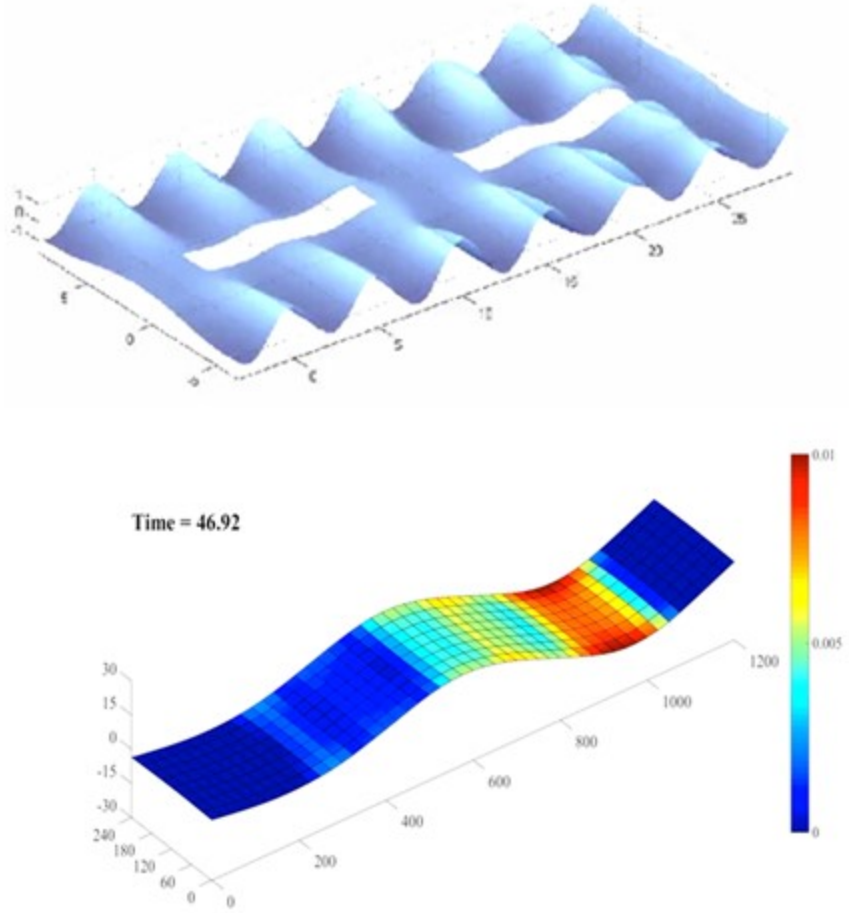
# Fluid-Structure Interaction

CMSS Computational Mechanics and Structural Systems Lab  
 Professor Phill-Seung Lee

## Hydro-elastic and -elastoplastic analysis

### Hydro-elastoplastic analysis of floating plate structures

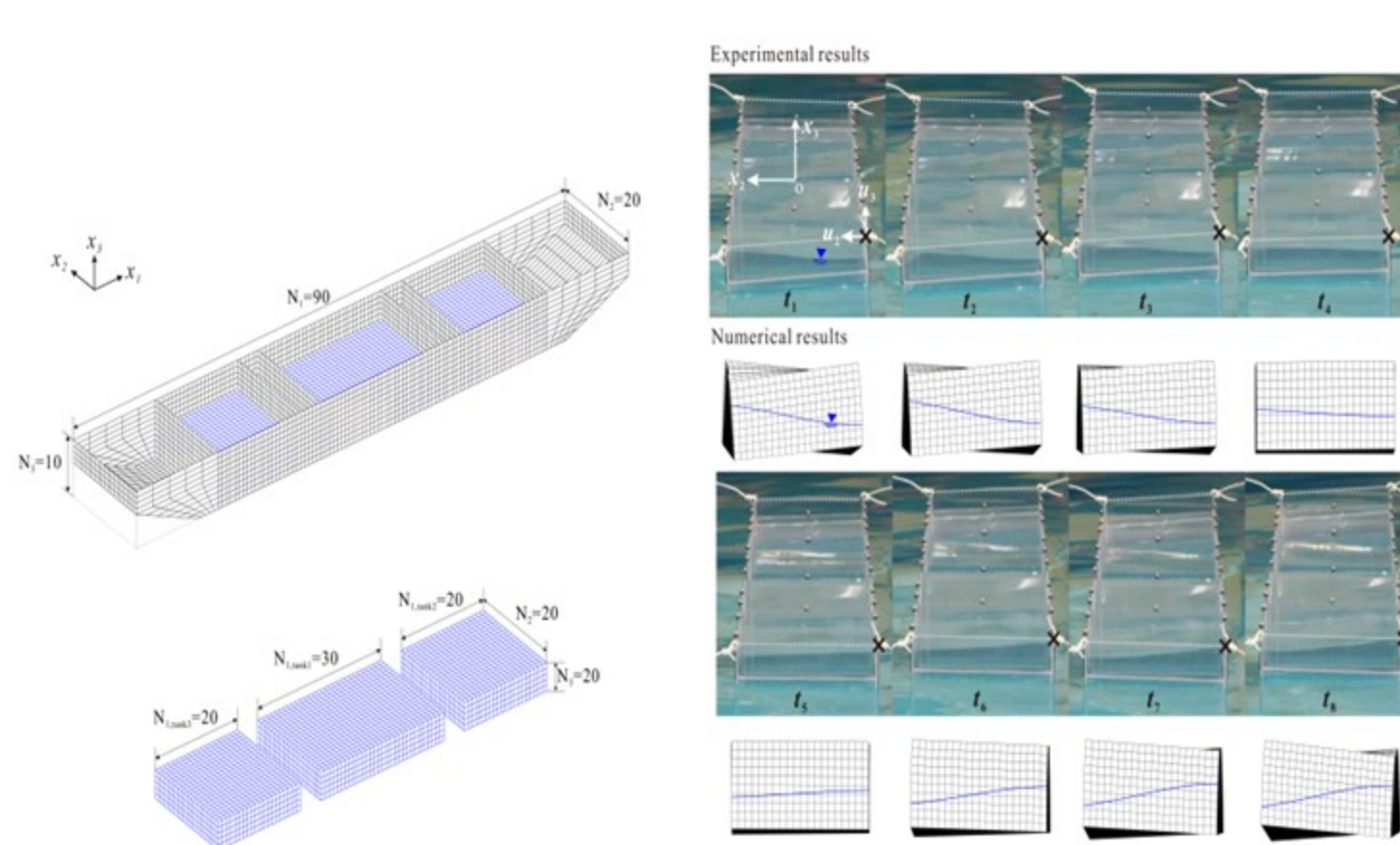
Joo-Seong Yoon (2016)



<Effective plastic strain of a floating plate>

### Numerical methods for hydro-static and -dynamic analysis of 3D elastic floating structures

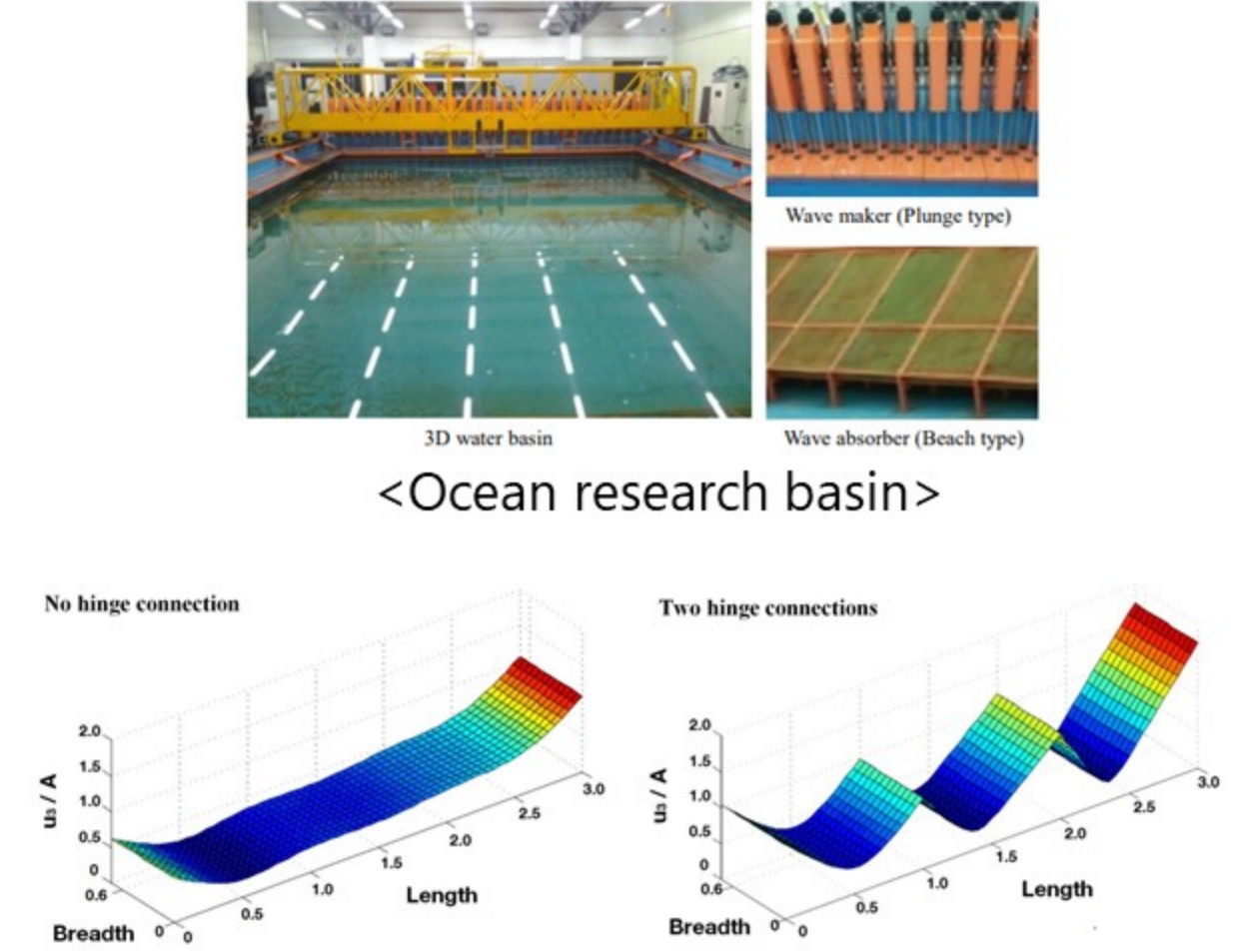
Ki-Tae Kim (2013), Kang-Heon Lee (2016)



<Hydroelastic response for FPU with internal fluid>

### Numerical and experimental studies on hydroelastic behavior of floating structures

Seong Pil Cho (2013)

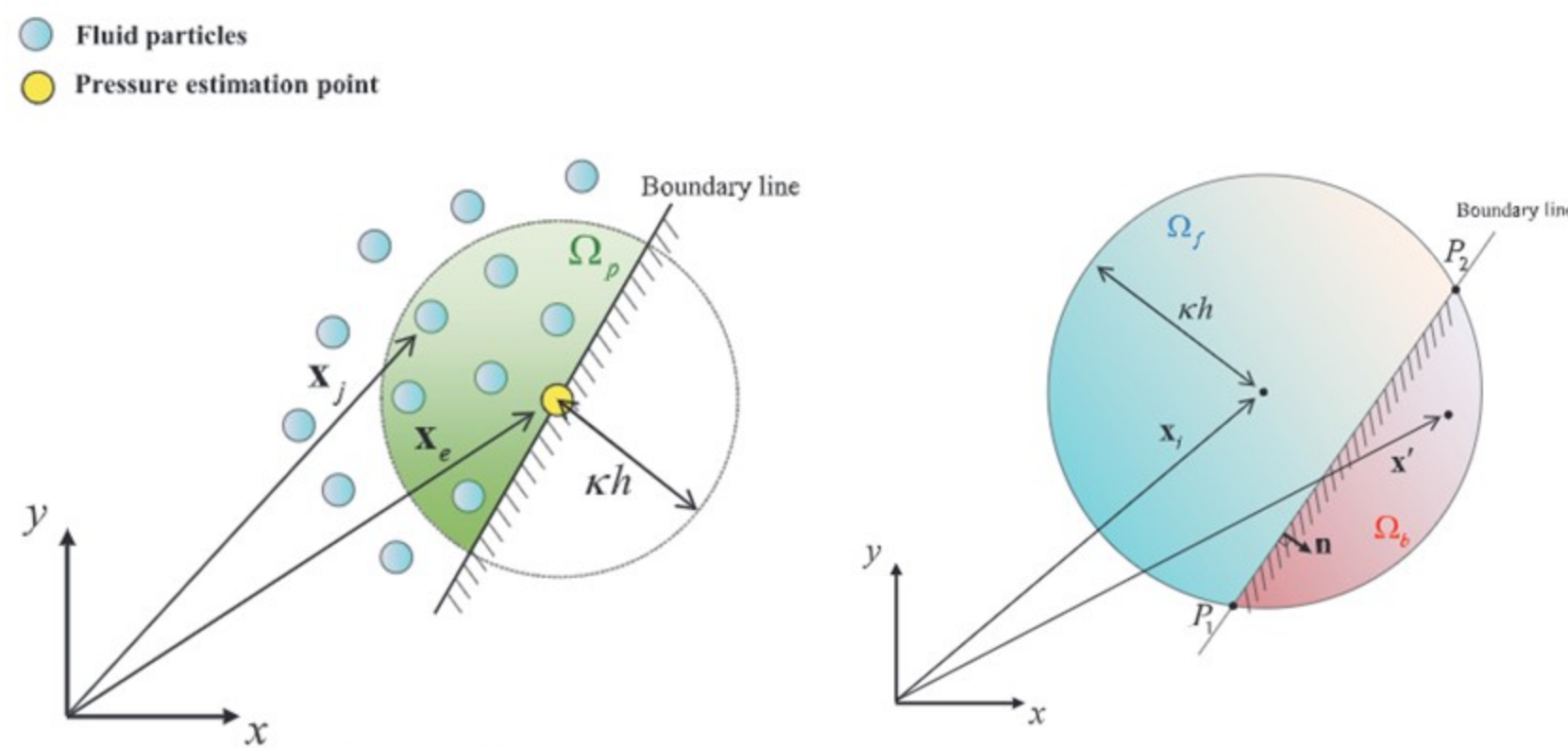


<Heave motion>

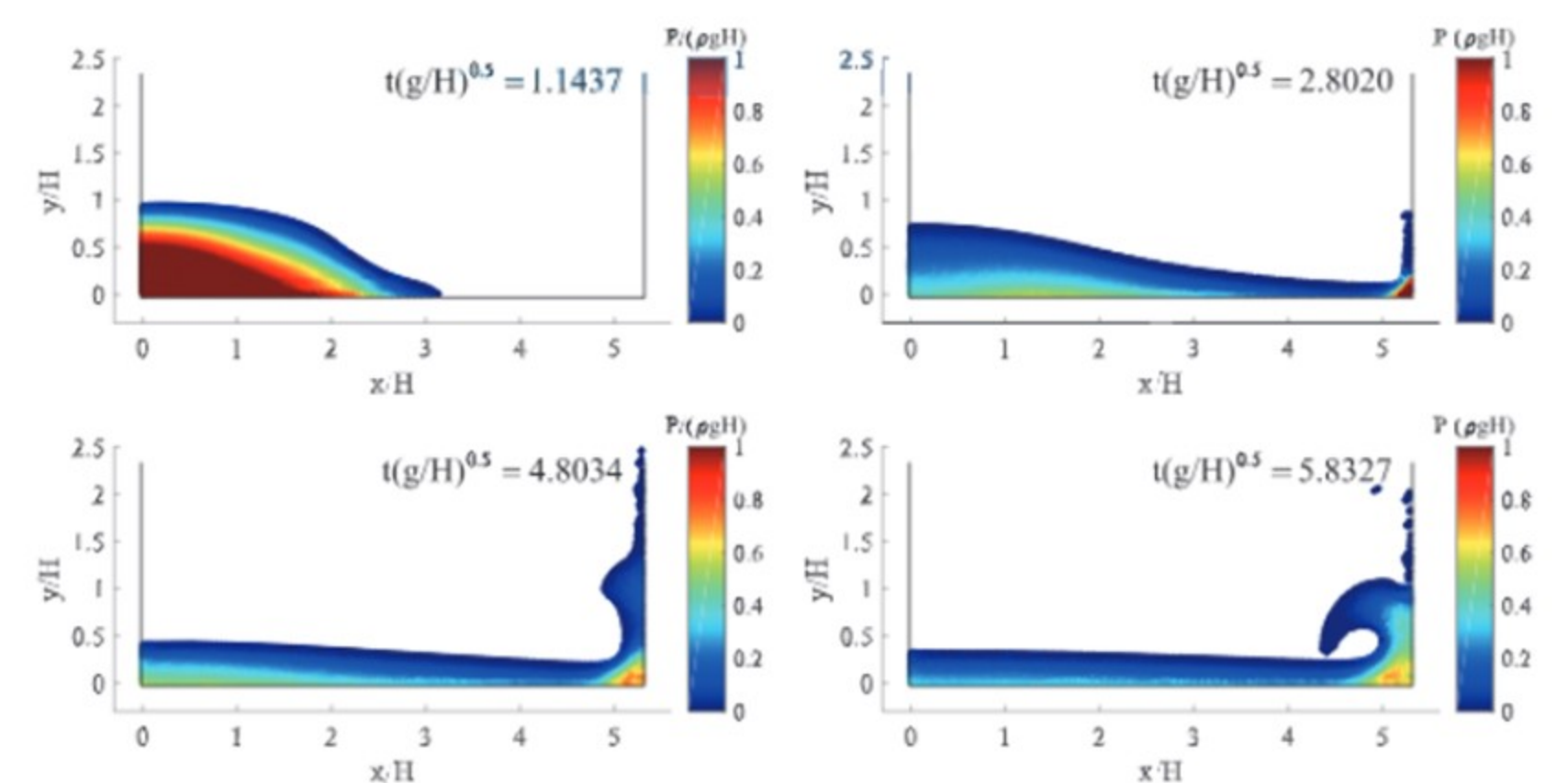
## Smoothed particle hydrodynamics (SPH)

### Direct imposition of the wall boundary condition in smoothed particle hydrodynamics

Hyung-Jun Park (2021)



<A particle near wall boundary>

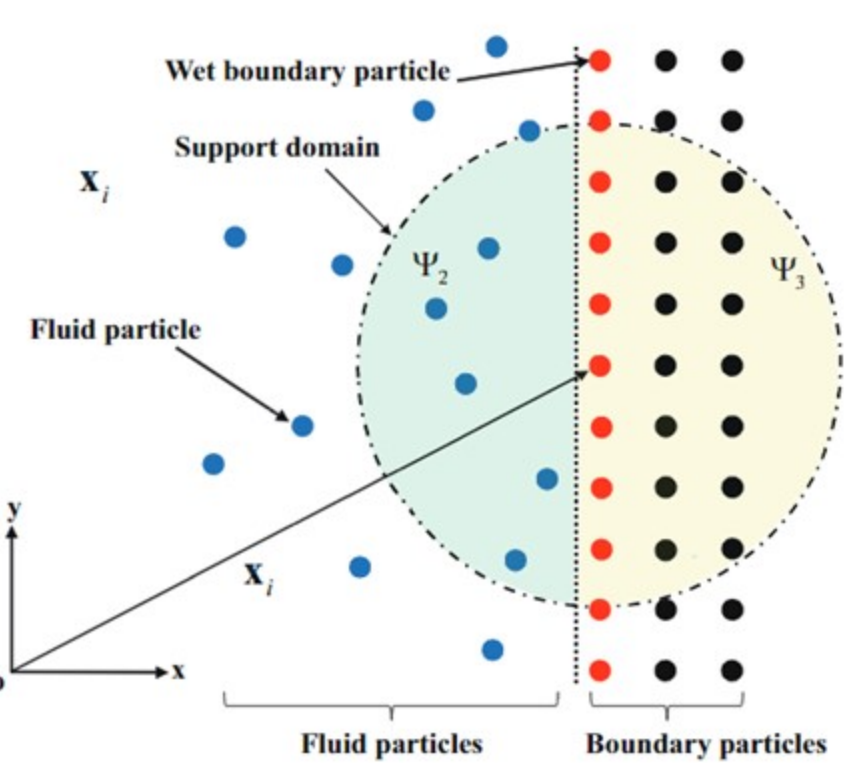


<Flow shapes and pressure distributions>

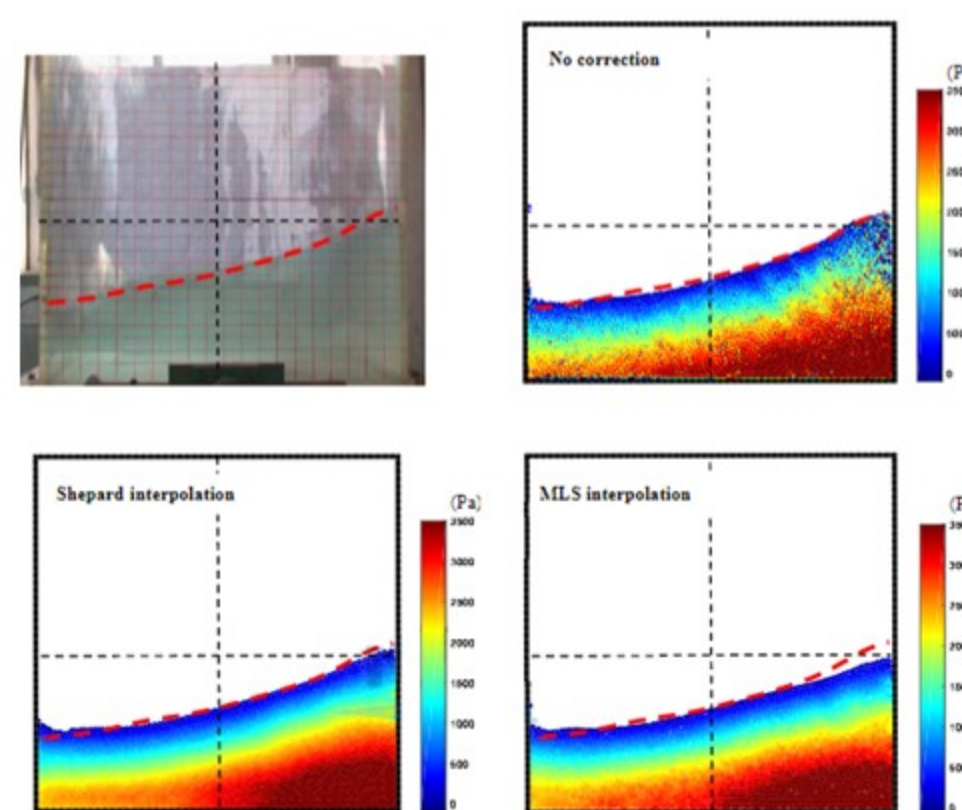
- An innovative method for treating the wall boundary in smoothed particle hydrodynamics (SPH) was proposed.
- The wall boundary condition is directly imposed by adding boundary truncation terms to mass and momentum conservation equations.

### Density correction in SPH and SPH-FEM coupling method for FSI analysis

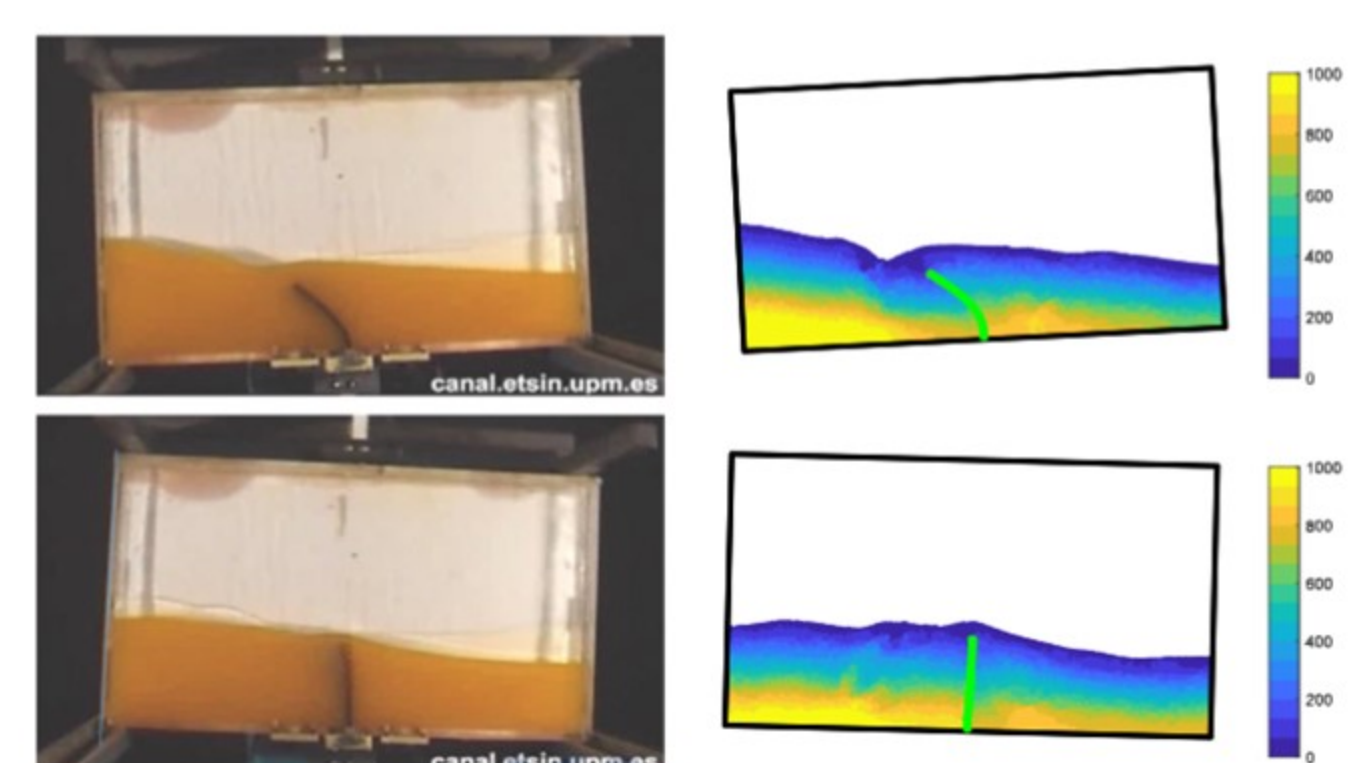
Hyun-Duk Seo (2021)



<Particle distributions near solid boundary>



<Sloshing flow in a rolling tank>



<Deep oil sloshing tank with clamped elastic baffle>

- An effective density correction method for smoothed particle hydrodynamics (SPH) and a new coupling method for the fluid-structure interaction (FSI) analysis were developed.
- The hydrodynamic loads acting on elastic structures can be accurately evaluated and the fluid flow characteristics induced by the dynamic response of the structure can be analyzed.

