

Sloshing

PENG

Created: 20260722, Version: 20260801

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Nonlinear resonance is due to the exchange of energy between linear wave modes [1].

Assumption 1.1. *Potential flow:*

- *irrotational*
- *inviscid*
- *incompressible*

Definition 1.2. *Governing equations:*

$$\Delta\phi + \phi_{zz} = 0 \quad \text{for } x \in D, \quad -h < z < \epsilon\eta \quad (1.1)$$

$$\phi_t + \eta + \frac{\epsilon}{2} (|\nabla\phi|^2 + \phi_z^2) = 0 \quad \text{for } x \in D, \quad z = \epsilon\eta \quad (1.2)$$

$$\eta_t + \epsilon \nabla\phi \cdot \nabla\eta = \phi_z \quad \text{for } x \in D, \quad z = \epsilon\eta \quad (1.3)$$

$$n \cdot \nabla\phi = 0 \quad \text{for } x \in \partial D, \quad -h < z < \epsilon\eta \quad (1.4)$$

$$\phi_z = 0 \quad \text{for } x \in D, \quad z = -h \quad (1.5)$$

Why does heave excitation lead to either symmetrical or asymmetrical modes?

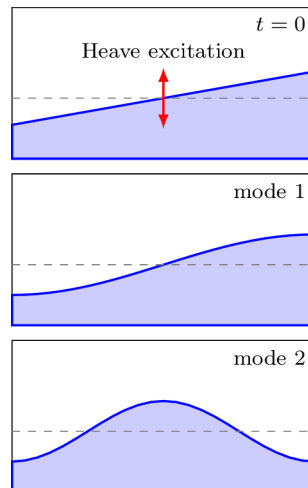


Figure 1.1: Faraday wave modes

References

- [1] Matthew Durey and Paul A Milewski. “Resonant triad interactions of gravity waves in cylindrical basins”. In: *Journal of Fluid Mechanics* 966 (2023), A25. issn: 0022-1120.