

Sloshing

PENG

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1 Introduction

Definition 1.1 (dispersion).

- *frequency dispersion*
- *amplitude dispersion*

Definition 1.2 (nonlinear resonance). *Nonlinear resonance is a mechanism by which energy is continuously exchanged between a small number of linear wave modes [1].*

2 Analytical Method

Assumption 2.1. *Potential flow:*

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

Definition 2.2. *Governing equations:*

$$\Delta\phi + \phi_{zz} = 0 \quad \text{for } x \in D, \quad -h < z < \epsilon\eta \quad (2.1)$$

$$\phi_t + \eta + \frac{\epsilon}{2} (|\nabla\phi|^2 + \phi_z^2) = 0 \quad \text{for } x \in D, \quad z = \epsilon\eta \quad (2.2)$$

$$\eta_t + \epsilon \nabla\phi \cdot \nabla\eta = \phi_z \quad \text{for } x \in D, \quad z = \epsilon\eta \quad (2.3)$$

$$n \cdot \nabla\phi = 0 \quad \text{for } x \in \partial D, \quad -h < z < \epsilon\eta \quad (2.4)$$

$$\phi_z = 0 \quad \text{for } x \in D, \quad z = -h \quad (2.5)$$

Why does heave excitation lead to either symmetrical or asymmetrical 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.

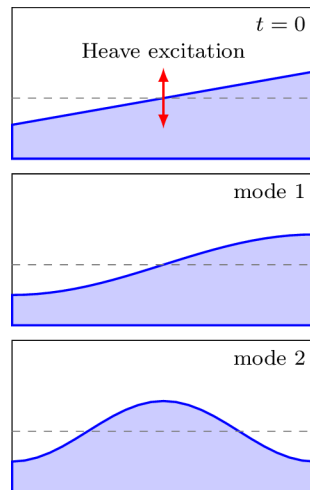


Figure 2.1: Faraday wave modes