Hydrodynamic Interaction of Submerged Slotted Barrier under Solitary Wave

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Introduction

• Slotted barrier features thin, rigid, vertical and permeable which may enhance the water circulation and sediment movements.
• Solitary wave only has a single crest so the hydrodynamic interaction is undisturbed by previous and following waves.
• Vortices would be generated due to flow separation and the flow field in the vicinity of the object would become turbulent as water waves pass over an obstacle.
• This motivated the current study to investigate hydrodynamic interaction between a solitary wave and a submerged slotted barrier.

Experiment

• PIV → High speed camera (maximum 1000 frames per second) with continuous laser.
• Mean quantities are ensemble-averaging over 20 repeated trials.

Wave Gauge Data

• All of the measurements are almost overlapped which indicates high degree of repeatability in present experiments.

Conclusions and Future Work

• Vortex shedding processes are observed during solitary wave passing over a submerged slotted barrier.
• High temporal and spatial resolution of mean velocity fields are recorded by PIV system.
• Further attempts are made to reproduce this setup numerically using both RANS (Lin and Liu, 1998) and LES model (Wu et al., 2014).

References


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