

# Laboratory observation on vortices induced by internal solitary wave over a ridge

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## Abstract

The phenomenon of vortices induced by internal solitary wave (ISW) is one of the major research themes in marine science. This poster illustrates the vortices induced by an ISW over a ridge in a laboratory experiment using advanced instruments (i.e., laser, particle image velocimetry, and higher-speed camera).

## Introduction

Like the ISW activities in other regions of the world, it is believed that ISW in the South China Sea (SCS) may affect offshore oil drilling operations, nutrient pumping, and resuspension of pollutants from seabed in relatively deepwater (Osborne *et al.*, 1978). Therefore, research on ISW propagation through in the SCS, as well as its generation mechanism, wave evolution and vortex formation will bear important implication. Presently, papers describing the physical process of vortices induced by ISW across an irregular topography are rather limited, not to mention that in the Luzon Strait, between Taiwan and the Philippines (see subset in Fig. 1; as Sveen *et al.*, 2002, Guo *et al.*, 2004). This poster will illustrate the results of laboratory experiments on vortices induced by an ISW over a ridge in a flume.

## Experimental apparatus and preliminary results

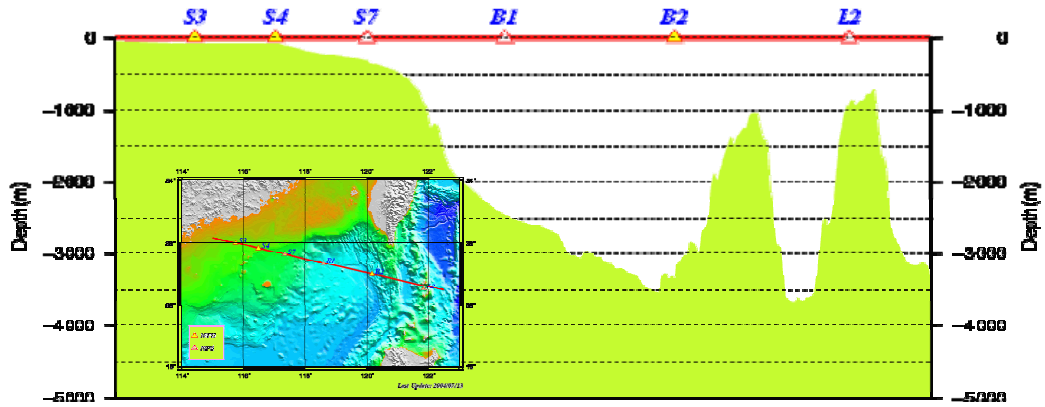
Experiments were performed using a two-layer fresh/brine stratified fluid system in a wave tank of 14 m long with a cross-section of 0.5m high by 0.25m wide. An ISW was generated by a “collapse mechanism” upon the lifting of a vertical gate at one end of the flume. Particle image velocimetry (PIV) and two flow visualization techniques (i.e., including laser induced fluorescence technique and particle tracing technique) were used to observe the vortices induced by an ISW over a triangular ridge (sketched as Fig. 2). One of experimental results is demonstrated in Fig. 3. More interesting results will be presented in the formal poster.

## References

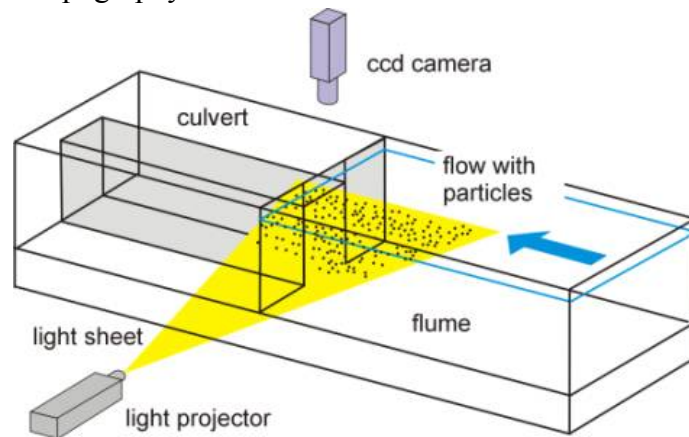
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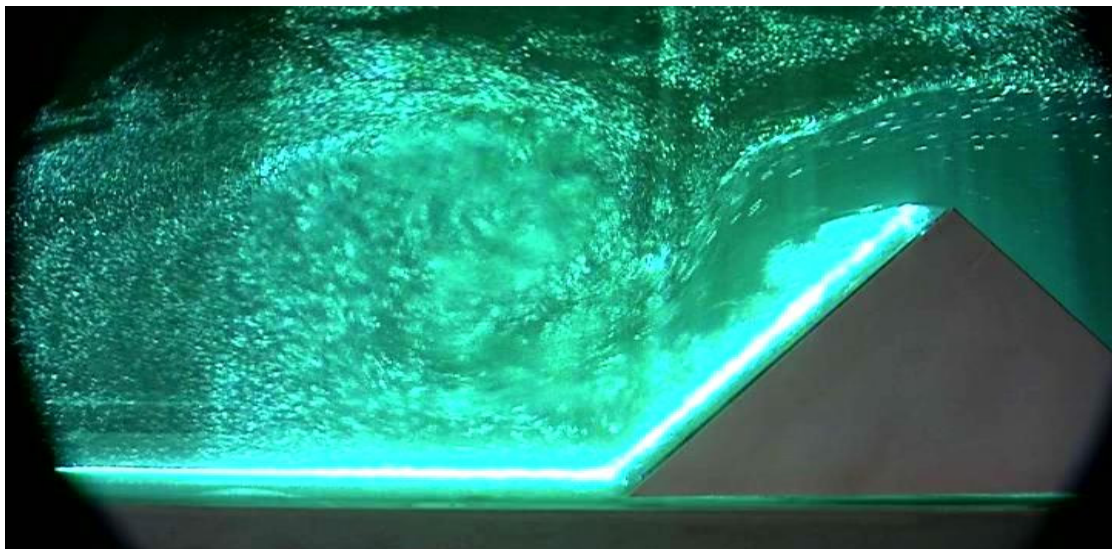
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**Figure 1** Variable topography in Luzon Strait and the northern SCS.



**Figure 2** Schematic diagram showing the particle image velocimetry system used



**Figure 3** A picture showing vortices induced by an ISW of elevation over a ridge from the right-hand-side of the picture frame