

# Three breaking solitary waves

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Wave breaking is the main driving force in the surf-zone hydrodynamics as well as sediment transport in the coastal area, but its three-dimensional flow structure and the rapid aeration have hindered full understanding of its physics. Traditionally, mean flow fields of periodic incident waves have been mainly studied, while some have studied breaking of a solitary wave to isolate a single runup–backwash process. Noting that interactions between successively breaking waves are obscure or absent in both approaches, we carried out experiments on the interaction using a train of three identical solitary waves with the wave height  $H = 4.25$  cm in the constant offshore water depth  $h = 20$  cm, that break on a  $1/20$  sloped beach. Figures 1 & 2 show the experimental setup and typical data can be seen in figure 3.

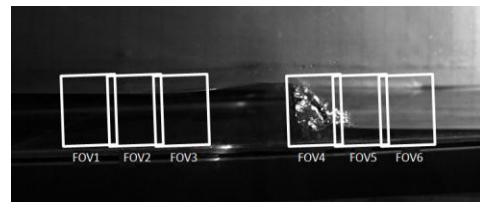
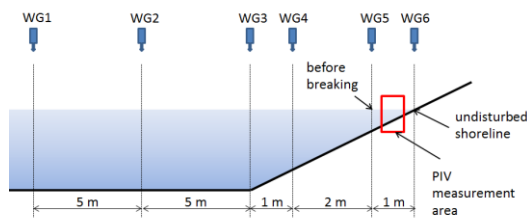


Figure 1 Locations of instruments (not to scale).

Figure 2 Locations of PIV fields-of-view (FOVs).

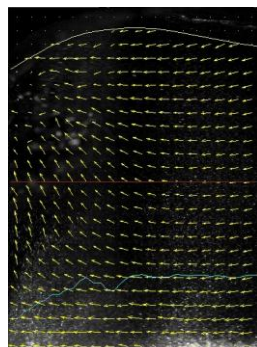


Figure 3. Incoming of the third wave at FOV 1. White line is the water surface profile, yellow arrows are the velocity vectors, and blue line indicates Froude numbers, with the red line marking  $Fr = 1$ .

In the talk, it will be shown that the vast amount of data can be effectively summarized in terms of Froude number, which connects our data to the existing theories on moving hydraulic jump in open-channel flow.