



Laboratory experiment on waves propagating and breaking on a beach: regular and solitary waves.

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Particle Image Velocimetry (PIV) measurements were performed in a wave tank under water waves propagating and breaking on a 1/15 sloping beach. The wave shoaling occurred in the surf zone over a large domain covering several wave wavelengths from incipient breaking up to swash zone beyond the shoreline. PIV spatial interrogation windows have to be small enough to obtain accurate velocities, and one window cover only a small part of the domain. To overcome this problem and to measure instantaneous velocity field over the whole surf zone area, we have split the full field into twelve overlapping smaller windows of same sizes. Local measurements were synchronized to each other using pulsed TTL triggers and wave gauge data. The full velocity field was then reconstructed at every time step by gathering the twelve PIV fields. We measured then the complete space-time evolution of velocity field over the whole surf zone. We calculated instantaneous, mean and fluctuating components of the velocity and transport fields. We estimated an average air-water mixing ratio in each point of the surf zone. We determined also the ensemble-period-average and phase-average components of the flow with their associated fluctuating parts. The same experimental technique was applied to the propagation of a Tanaka-like solitary wave breaking on a sloping beach.