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Fine-scale processes of plunging wave in deep water

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Follow the introductions of numerical methodology and preliminary results of extreme wave breaking modeling in Dao et al., (2010), further comparisons and investigations of the breaking processes of the plunging wave in deep water have been carried out. The comparisons showed that numerical results consistently agree very well with laboratory observations (Bonmarin, 1989; Kway, 2000) throughout the breaking process. Detailed and deeper investigations of the breaking process have revealed interesting phenomena that have not been observed in the past. These include the bifurcations of the flow field relative to the crest velocity, especially on the wave front near the crest, circulations coupled to the air entrapment process, the air tube "rolling" forward, vertical jet collapsing in conjunction with air "squirting" out from the entrapped air pocket generating the characteristic vertical water sprays, distributions of pressure, acceleration and vorticity in the vicinity of the plunging crest, and the dissipation of wave energy associated with the plunging.

Reference

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