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Modeling of extreme wave breaking

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It is well known that extreme wave loadings can lead to serious damages of marine structures. Past researches have shown that extreme breaking waves, especially the plunging type, are amongst the worst. The process of breaking wave impact is highly complex and, apart from the general knowledge that impact loadings are highly impulsive, the dynamics of the impact are still poorly understood. Such extreme waves in deep water are characterized by steep wave fronts and an energetic wave crest. Using an advance numerical methodology, Smoothed Particle Hydrodynamics, our study is able to reproduce accurately the kinematics and dynamics of the breaking process of extreme waves. Once the waves and their breaking process are modelled successfully, the characteristics of their impact process on offshore structures will be carried on. The methodology and numerical results will be presented and discussed.