Potential flow reconstruction of a breaking wave measured by PIV

Recent studies of breaking waves have shown the existence of a quasi-universal breaking onset criterion, based on the ratio B=u/c at the crest of a wave, but in simulations, use of this criterion can be very sensitive to model parameters. We study this question numerically, using a fully nonlinear potential flow (FNPF) model that accurately reproduces the free-surface motion, even beyond wave overturning.
Plunging waves were generated in the ECM wave tank, and the surface measured with wave gauges and a video camera, allowing for a particle image velocimetry (PIV) analysis. Both numerical simulations and simplified parameterizations are compared with the PIV data, including fluid velocities at breaking onset and wave phase velocity.