Breaking waves in fully non-linear potential flow models

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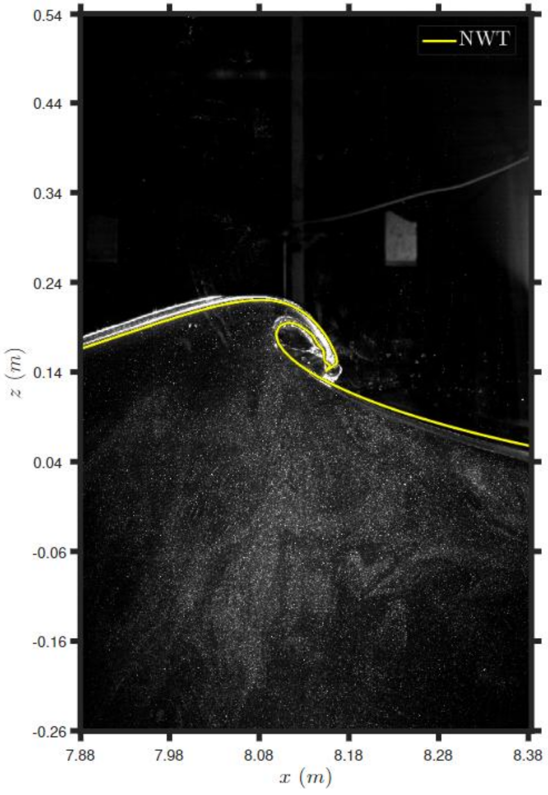
Potential flow limits

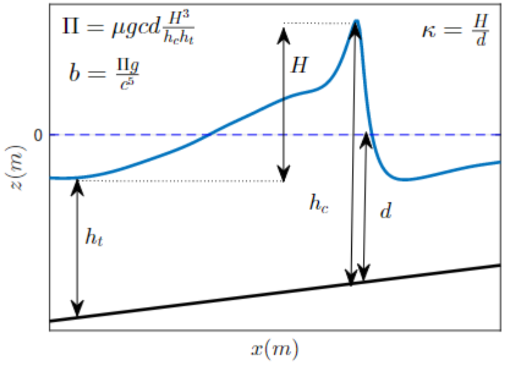


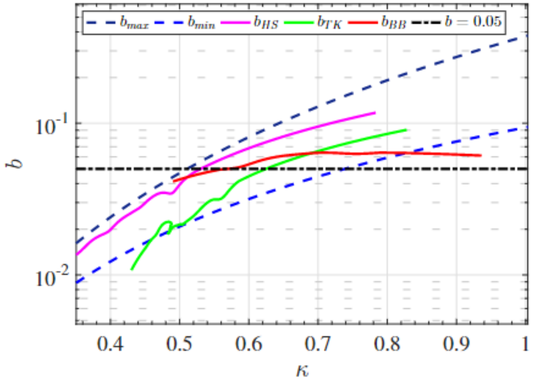
Wave breaking implemented by a damping pressure

- Power dissipated by a breaking wave, $\Pi(t) = \int P_b(x,y,t)\varphi_n(x,y,t)dA$
- Damping pressure, $P_b(x,y,t) = \frac{\Pi(t)s(x,y)\varphi_n(x,y,t)}{\int s(x,y)\varphi_n(x,y,t)^2 dA}$
- The dynamic boundary condition (Bernoulli eq. on the free surface): $\frac{D\varphi}{Dt} = -gz + \frac{1}{2}|\nabla\varphi|^2 - \frac{P_b}{\rho}$

Accurately capture the overall physics of breaking waves

- How well do we understand the physics of a breaking wave?
- How much power should be dissipated?
- When does breaking start? When does it end?





Proposed wave breaking model applied to 2D and 3D cases