1038-76-322   **Zhiwu Lin*** (`lin@math.missouri.edu`), Department of Mathematics, University of Missouri-Columbia, Columbia, MO 65203. *Unstable solitary water waves and wave breaking.*

We consider 2D traveling solitary wave solutions of irrotational surface water waves. The highest wave has a 120 degree angle at the crest, which was known by Stokes in 1880. It was found in the 1970s that the maxima of energy and the travel speed of solitary waves are not obtained at this highest wave. Under the assumption of non-existence of secondary bifurcation which was confirmed numerically, we prove linear instability of solitary waves which are higher than the wave of maximal energy and lower than the wave of maximal travel speed. We also show that there exist unstable waves approaching the highest wave. These unstable waves are of large amplitudes and this instability can lead to breaking of waves, for example when they approach beaches. (Received February 12, 2008)