Dynamics of Unstable Stokes Waves

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The Peregrine breather solution of the nonlinear Schrödinger equation is investigated numerically and experimentally to analyze the dynamics of modulationally unstable Stokes waves. The evolution of the water surface elevation is studied numerically by solving the Navier-Stokes equations. The comparison of the numerical results with wave tank experiments show a very good agreement. The results confirm the ability of the chosen method to model the modulation instability of Stokes waves, in particular, breather dynamics in water waves with high accuracy even up to the onset of breaking.