

Superharmonic Instability of Stokes Waves

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Abstract

We consider the classical problem of water waves on the surface of an ideal fluid in 2D. This work is concentrated on the study of Stokes waves at finite and infinite depths. We consider the stability of nearly limiting Stokes waves at infinite depth to superharmonic perturbations. We identify previously inaccessible branches of instability in the equations of motion for fluid, and find that real positive eigenvalues of the linearized problem converge to a selfsimilar curve as a function of steepness. The power law is suggested for unstable eigenmodes in the immediate vicinity of the limiting Stokes wave. The behaviour of Stokes wave in finite depth is also considered.