Instability of Stokes Waves

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Abstract

We consider an ideal 2-dimensional fluid of infinite depth with potential flow and free surface. The equations of motion of free surface are linearized around Stokes waves, and we study the resulting eigenvalue problem. We discuss the numerical approach for computing the spectrum of the linearized operator by using a matrix-free Krylov methods and the Fourier-Floquet-Hill technique. We present the spectrum of Stokes wave of various steepnesses, discuss the maximum growth rate for these waves, and discuss the Benjamin-Feir, high-frequency and superharmonic (localized) instabilities of these waves.