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Stability of Lagrangian Ideal Flows

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A general method is presented to investigate the stability of ideal incompressible flows described in Lagrangian representation. Based on the theory of short-wavelength instabilities, the problem is reduced to a transport equation which involves only the distortion matrix of the equilibrium flow. Theory is applied to Gerstner's rotational free-surface gravity waves. It is shown that they are three-dimensionally unstable when their steepness exceeds 1/3.

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