
Global bifurcation of steady gravity water waves with critical layers

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Abstract

I will present some recent results on the problem of two-dimensional travelling water waves propagating under the influence of gravity in a flow of constant vorticity over a flat bed. By means of a conformal mapping and an application of Riemann-Hilbert theory, the free-boundary problem is equivalently reformulated as a one-dimensional pseudodifferential equation which involves a modified Hilbert transform and, moreover, has a variational structure. Using the new formulation, existence is established, by means of real-analytic global bifurcation theory, of a family of solutions which includes waves of large amplitude, even in the presence of critical layers in the flow. This is joint work with Adrian Constantin and Walter Strauss.

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