Toland, J. F.

On a pseudo-differential equation for Stokes waves. (English) Zbl 1028.35126

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Author's summary: It is shown that the existence of a smooth solution to a nonlinear pseudodifferential equation on the unit circle is equivalent to the existence of a globally injective conformal mapping in the complex plane which gives a smooth solution to the nonlinear elliptic free-boundary problem for Stokes waves in hydrodynamics.

A dual formulation is used to show that the equation has no non-trivial smooth solutions, stable or otherwise, that would correspond to a Stokes wave with gravity acting in a direction opposite to that which is physically realistic.

Reviewer: P.Godin (Bruxelles)

MSC:

35Q35	PDEs in connection with fluid mechanics
35S05	Pseudodifferential operators as generalizations of partial differential operators
35R35	Free boundary problems for PDEs
76B15	Water waves, gravity waves; dispersion and scattering, nonlinear interaction

Keywords:

nonlinear pseudodifferential equation; conformal mapping; nonlinear elliptic free-boundary problem for Stokes waves

Full Text: DOI