

# A Hilbert-transform formulation of the Stokes wave problem and its consequences

John Toland

University of Bath, Department of Mathematical Sciences  
Claverton Down, Bath BA2 7AY, U.K.

`jft@maths.bath.ac.uk`

It will be shown how a  $2\pi$ -periodic solution  $u$  of the non-linear equation

$$Cu' = \lambda\{u + uCu' + C(uu')\}$$

gives rise to a solution of the classical periodic water-wave problem on a flow of infinite depth. Here  $C: L_2(S^1) \rightarrow L_2(S^1)$  denotes the Hilbert transform and the prime denotes differentiation. A brief survey of the properties of this equation will be given.