

TWO-LAYER SHALLOW-WATER INTERNAL WAVES: STABILITY AND WEAK SOLUTIONS IN MIXED TYPE PDEs

PAUL MILEWSKI

University of Bath, Somerset - Inglaterra

Resumo

We study the problem of long waves at the interface of two fluid layers of different densities and present three main results: (i) In the weak stratification (Boussinesq) case, the equations of mixed-type are well posed for times up to breaking if the initial data is in the hyperbolic region of phase space. The physical interpretation of this result is that a type of nonlinear stability holds for sufficiently large Richardson number. (ii) In the general (non-weak stratification) case there may be initially hyperbolic data that exit into the elliptic region (i.e. the fluid undergoes spontaneous shear instabilities.) (iii) Assuming waves break, we propose a simple choice of conservation laws that yield weak solutions allowing for mixing between the two fluids.