



Conjugate flows and amplitude bounds for extreme internal waves

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We discuss the limitations caused by the conservation of mass, momentum and energy for 2D internal gravity waves in stratified fluid. In several cases, the amplitude of permanent wave does not exceed its critical value, which may be found a priori as the broadening limit for extreme table-top solitary wave. This broadening limit can be checked by fixing horizontal midsection flow to be conjugated with upstream flow. The problem on conjugate flows was formulated first by Benjamin (1966) as the nonlinear eigenvalue problem for the Dureuil-Jacotin – Long equation. Here we consider this problem analytically for a wide class of density profiles in primary flow. Especially, we discuss the circumstances leading to the non-uniqueness of the broadening limits. The role of background density profile as well as the influence of fine-scale stratification is considered in more details. This work was supported by RFBR (grant No 07-01-00309), INTAS-SB RAS Program (grant No 06-1000013-9236) and Interdisciplinary Program of SB RAS (Project No 2006-113).