HYPERBOLICITY OF THE LAYERWISE DISCRETIZED HYDROSTATIC EULER EQUATION : THE BILAYER CASE

NINA AGUILLON, EMMANUEL AUDUSSE, EDWIGE GODLEWSKI,
AND MARTIN PARISOT

Several models of free surface flows in the literature are based on a layerwise discretization of the Euler or Navier-Stokes equations. We consider a shallow water type model with two layers derived in [1] which involves a mass exchange at the interface between the two layers, and is closed by some algebraic conditions. The resulting system of PDE's can be set and analyzed in an hyperbolic framework [2]. We prove the well-posedness of the Riemann problem in the two dimensional case. Due to the mass exchange, the result is not a simple extension of the Riemann problem in the one dimensional case. Several additional difficulties appear with the tangential velocity such as nonconservative products and coalescence of waves. Eventually, we provide several explicit solutions of the Riemann problem.

References

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E-mail address: `aguillon@ljll.math.upmc.fr`
E-mail address: `audusse@math.univ-paris13.fr`
E-mail address: `edwige.godlewski@upmc.fr`
E-mail address: `martin.parisot@inria.fr`

INRIA, ANGE TEAM, 2 RUE SIMONE IFF, F-75012 PARIS, FRANCE; CEREMA, MARGNY-LÈS-COMPIÈGNE, FRANCE; CNRS, UMR 7598, LABORATOIRE JACQUES-LOUIS LIONS, PARIS, FRANCE; SORBONNE UNIVERSITÉS, UPMC UNIV. PARIS 06, UMR 7598, LABORATOIRE JACQUES-LOUIS LIONS, PARIS, FRANCE