

Computing Solutions of the Riemann Problem for the Ripa System

M. D. Thanh¹

Abstract: Solutions of the Riemann problem may be used to build numerical schemes such as the Godunov scheme for computing approximate solutions of the initial-value problem. In this work, we study the Riemann problem for the Ripa system, that is, the system of shallow water equations with horizontal temperature gradients. The model under investigation has the form of a nonconservative system, and it is hyperbolic, but is not strictly hyperbolic. We can design algorithms to compute solutions of the Riemann problem. It is interesting that there may be up to three distinct solutions. A resonant phenomenon is observed, where multiple waves associated with different characteristic fields propagate with the same shock speed.

¹ Department of Mathematics
International University
Quarter 6, Linh Trung Ward, Thu Duc, Ho Chi Minh City, Vietnam
mdthanh@hcmiu.edu.vn