

Riemann problems and delta-shock solutions in hyperbolic systems with external forces

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In this talk, we explore the formation and interaction of delta-shock waves for a nonsymmetric Keyfitz-Kranzer and pressureless gas systems under the influence of external forces. Drawing from recent studies, we highlight the intricate dynamics of Riemann problems and delta-shock wave solutions, emphasizing systems affected by Coulomb-like friction and gradually-degenerate damping. We analyze the convergence of solutions between different systems, focusing on the transition from pressure-supported systems to pressureless dynamics as external forces evolve. Key theoretical insights are supported by robust numerical results obtained using the Lagrangian-Eulerian scheme, showcasing delta-shock wave behavior and its evolution under external forces. This work provides a comprehensive framework for understanding nonlinear wave phenomena in applied sciences, with implications for systems where damping and external forces play critical roles.

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