A New Approach to the Riemann Problem for Hyperbolic Conservation Laws

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The Riemann problem for hyperbolic systems of conservation laws plays a central role in the theory, because its solution describes both the local structure and the long time behavior of general solutions and serves, in addition, as the building block for solving the Cauchy problem by either the random choice method or the front tracking algorithm.

The classical approach for solving the Riemann problem pieces together shocks and rarefaction waves with the help of shock and rarefaction wave curves. More recently, the vanishing viscosity method has also been successfully employed. The lecture will discuss how the classical Riemann problem can be formulated and solved as a variational problem.