

Semi-hyperbolic patches and sonic lines of two-dimensional Riemann problems of Conservation laws

Kyungwoo Song

Kyung Hee University (kyusong@khu.ac.kr)

We study the regularity of semi-hyperbolic patches of self-similar solutions near sonic lines to a Riemann problem for the two-dimensional Euler system and the pressure gradient system. In the self-similar plane, the governing equation becomes quasilinear and changes its type. The type of the flow in the far-field is hyperbolic and the type of the flow near the origin is mixed. The sonic lines and semi-hyperbolic patches are located inside the mixed area. We also investigate the property of the sonic lines located between the elliptic part and the hyperbolic part, more precisely the semi-hyperbolic part. This type of solution appears in the transonic flow over an airfoil and the Guderley reflection, and is common in the numerical configurations of Riemann problems.