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Radon measure solutions for steady hypersonic-limit Euler flows passing two-dimensional finite non-symmetric obstacles and interactions of free concentration layers. (English)

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Summary: By proposing a notion of Radon measure solutions of the compressible Euler equations, we consider in the paper uniform stationary hypersonic-limit flows passing a two-dimensional finite non-symmetric obstacle with static gas downstream behind the obstacle, and construct solutions with mass concentrated on the boundary of the obstacle and then on free layers beyond it. The Newton-Busemann pressure law on lifts/drags of the obstacle in hypersonic flow is rigorously derived. The pressure of the static gas influences the structure of the solution. Both terminations and interactions of the free concentration layers may be possible. We give some criterions about it and also present some numerical examples to demonstrate these possibilities.

MSC:

35Q31 Euler equations
35L65 Hyperbolic conservation laws
35L67 Shocks and singularities for hyperbolic equations

Keywords:

Radon measure solution; compressible Euler equations; pressureless gas; hypersonic flow; Newton-Busemann pressure law; initial-boundary value problem

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