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Characteristic decompositions methods for the multidimensional Euler equations. (English)

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Numerical methods in fluid dynamics, Proc. 10th Int. Conf., Beijing/China 1986, Lect. Notes Phys. 264, 216-221 (1986).

[For the entire collection see [Zbl 0598.00019](#).]

An approach is used for the determination of the physically relevant simple waves and their orientation, which is based on characteristic theory. This leads to a straightforward and algebraically simple decomposition consisting of two acoustic waves, one shear wave and one entropy wave. The propagation direction of the shear wave is parallel with the local pressure gradient and the propagation direction of the acoustic waves depends on the local strain rate tensor. In the second part of the paper it is shown how the decomposition can be used to construct a genuinely two-dimensional upwind-differencing scheme.

MSC:

76N10 Existence, uniqueness, and regularity theory for compressible fluids and gas dynamics

Cited in 8 Documents

76M99 Basic methods in fluid mechanics

76Q05 Hydro- and aero-acoustics

Keywords:

scalar simple wave transport equations; simple waves; characteristic theory; decomposition; shear wave; entropy wave; two-dimensional upwind- differencing scheme