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Asymptotic single and multiple scale expansions in the low Mach number limit. (English)

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An asymptotic analysis of the Euler equations in the limit of vanishing Mach number is presented, which can be employed to extend the validity of numerical methods from the compressible to the low Mach number regime. The work is based on the analysis recently proposed by Klein, whereby the paper is devoted to a rigorous mathematical justification of this asymptotic investigation in order to give reliable statements concerning the assumptions under which the results hold. In contrast to the mentioned earlier work, a single scale as well as multiple scale expansion is used depending on the spatial domain under consideration.

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MSC:

35L65 Hyperbolic conservation laws
35C20 Asymptotic expansions of solutions to PDEs
35B40 Asymptotic behavior of solutions to PDEs

Keywords:

asymptotic analysis; Euler equations; low Mach number

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