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MATHEMATICAL MODELLING OF TWO-SPECIES RELATIVISTIC FLUIDS*

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Abstract

An interface-capturing method is used to deduce equations governing fluid motion in a relativistic two-species flow. These kind of methods combine simple fluid flow equations, which are the balance law for particle number and energy-momentum tensor conservation equation for global fluid, the balance laws for particle number density of each species, with extra equations. Since equations of multi-species relativistic fluid are not closed assigning laws of the state of each species, closure equations are necessarily introduced. A model based on the axiom of existence of a temperature and an entropy for the global fluid, which verify an equation analogous to that holding in the case of a simple fluid, is formulated. Weak discontinuities compatible with such kind of mixture are also studied.

MSC: 83C99, 80A10, 80A17, 74J30, 76T99.

keywords: relativistic fluid dynamics, multicomponent, flow, discontinuity waves, nonlinear waves.

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