

The Behavior of Unsteady Non-Equilibrium Distribution Function and Exact Equilibrium Time for a Dilute Gas Mixture Affected by Thermal Radiation Field

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Abstract : In the present study, a development of the papers is introduced. The behavior of the unsteady non-equilibrium distribution functions for a rarefied gas mixture under the effect of non-linear thermal radiation field is presented. For the best of our knowledge this is done for the first time at all. The distinction and comparisons between the unsteady perturbed and the unsteady equilibrium velocity distribution functions are illustrated. The equilibrium time for the rarefied gas mixture is determined for the first time. The non-equilibrium thermodynamic properties of the system is investigated. The results are applied to the Argon-Neon binary gas mixture, for various values of both of molar fraction parameters and radiation field intensity. 3D-Graphics illustrating the calculated variables are drawn to predict their behavior and the results are discussed.

Keywords : radiation field, binary gas mixture, exact solutions, travelling wave method, unsteady BGK model, irreversible thermodynamics

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