THE SYSTEM OF ASYMPTOTICALLY PRECISE EQUATIONS FOR DESCRIBING TURBULENT GAS DYNAMICS WITH RADIATION

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The well-known derivation of the system of Boltzmann equations for a gas mixture does not depend on whether the gas flows under consideration are laminar or turbulent.

Considering asymptotic expansions of the solution of the system of kinetic Boltzmann equations for a gas mixture (see [1]) and the solution of the kinetic equation of radiation propagation in an optically thick medium without scattering (see [2]), we obtain the system of asymptotically exact equations to describe turbulent gas flows with radiation.

For the obtained system of equations, the entropy in turbulent gas flows only grows. This follows from our derivation of the equation of entropy change in the gas mixture.

References

1. **Serov, S. A.** Asymptotic Solutions of the Kinetic Boltzmann Equation and Multicomponent Non-equilibrium Gas Dynamics [Text] / S. A. Serov and S. S. Serova // Journal of Applied Mathematics and Physics – 2016. – Vol. 4, No. 8. – P. 1687.

2. **Serov, S. A.** Radiative Transfer: Asymptotic Solution of the Kinetic Equation of Radiation Propagation, Asymptotic Approximation of the Nth Order and Refined Boundary Conditions [Text] / S. A. Serov and S. S. Serova // Astronomy Reports – 2023. – Vol. 67, No. 12. – P. 1462.