On the Group Classification of Ideal Gas-Dynamic Relaxing Media

S. V. Khabirov[1]

Received February 22, 2023; revised April 10, 2023; accepted April 17, 2023

Abstract—The group analysis of differential equations of ideal gas dynamics is most developed. Earlier, the state equations for thermodynamic parameters were assumed to be time-independent. The time dependence may take place for relaxing media, for example, as a result of rheology or due to the energy averaging of processes in a multiphase medium. The problem of group analysis of relaxing media is posed. First, equivalence transformations are calculated that change only the state equations. Next, the problem of group classification is solved: it is required to find, up to equivalence transformations, classes of state equations for which the admitted group is extended. This problem is partially solved in the present paper.

Keywords: gas dynamics, relaxing state equations, equivalence transformations, group classification.

[1]Mavlyutov Institute of Mechanics, Ufa Federal Research Centre of the Russian Academy of Sciences, Ufa, 450054 Russia

e-mail: habirov@anrb.ru