INFLUENCE OF NON-UNIQUE MODIFIED FORMS OF SAHA AND GULDBERG-WAAGE EQUATIONS ON THERMOPHYSICAL PROPERTIES OF TWO-TEMPERATURE SF6 PLASMAS

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The aim of this work is to discuss the use of two quite different modified forms of Saha and Guldberg-Waage equations derived respectively by Potapov and Van de Sanden et al. to determine the thermophysical properties of Sulfur hexafluoride thermal plasmas in a two temperature model for both thermal equilibrium and non-equilibrium conditions. The influence of two different sets of Saha and Guldberg-Waage equations on the evolution of the species composition, thermodynamic properties and transport coefficients are presented for various values of pressures from 0.1atm to 10atm and ratios of the electron temperature to the heavy particle temperature from 1 to 20 with electron temperature range from 300 to 40 000 K. The great influence of the choice of the reaction excitation temperature on species composition, and hence other properties are also discussed as well. Most recent collision interaction potentials by adopting Devoto’s electron and heavy particle decoupling approach but expanded to the third-order approximation (second-order for viscosity) in the frame of Chapman–Enskog method have been utilized to the transport coefficients. Results are compared with available results of previously-published studies.