

The Consideration of Overlapping Lines in the Calculation of Radiative Power Emitted from CH₄ Thermal Plasma

Auteur: Benallal, R.; Liani, B.

Abstract/Résumé :

Net emission coefficients of radiation were calculated for isothermal plasma of methane as a function of the plasma temperature 5,000 30,000 K and the arc radius 0 mm to 10 mm at atmospheric pressure. Calculations take into account continuum and line radiations, special attention has also been given to the influence of overlapping spectral lines. The line shapes in our calculations are given by convolution of Doppler and Lorentz profiles, resulting in a simplified Voigt profile. In the case of a hydrogen profile, we used the Vidal tables, and the four first Lyman lines and the four first Balmer lines were considered. This calculation was carried out on the assumption of local thermodynamic equilibrium and in a nondiffusive environment. The net emission coefficient calculation for pure argon plasma was compared with the experimental results of Evans in our previous work. We used the escape factor, and our results were higher than those of the experiment. In this paper, we explain why, using the escape factor, the radiation is overestimated. The net emission coefficient obtained from a real spectrum was compared with Essoltani work's which used the line-by-line method for pure argon plasma.

Keywords/Mots clés :

Journal title / Revue : PLASMA SCIENCE & TECHNOLOGY

DOI:
10.1002/cbdv.201200028

"issue" :12

"volume" 14

"Bp" 1073,EP 1078

PD : DEC-2012

UT: 10.1088/1009-0630/14/12/07

SN : 1009-0630

WOS:00031269530000