

EFFECT OF RADIATION TRANSFER
ON A DEVIATION OF DENSE
ELECTRIC-ARC PLASMA
FROM THE EQUILIBRIUM
STATE: CRITERION
APPROACH

V.A. Zhovtyansky, Yu.I. Lelyukh, Ya.V. Tkachenko

Institute of Gas, Nat. Acad. of Sci. of Ukraine
(39, Degtyarivs'ka Str., 03113, Ukraine;
e-mail: zhovt@ukr.net)

S u m m a r y

A principal role of radiation emission processes in deviations of the electric-arc plasma at the atmospheric pressure from a state of local thermodynamic equilibrium has been estimated, by taking the radiation transfer into account. The problem was considered using a cylindrical wall-stabilized electric arc as an example. The solution was obtained in the approximation of local thermodynamic equilibrium with regard for the processes of radiation transfer and radiation losses in plasma. The results of numerical simulation obtained for copper atoms under conditions that correspond to the state of plasma in the atmospheric electric arc between melting copper electrodes confirm the existence of deviations from the equilibrium distribution between the populations at the resonance and ground energy levels.