

Abstract Submitted
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The influence of double ionization on the arc attachment in high intensity discharge lamps* FRANK SCHARF, ANDRE BERGNER, JUERGEN MENTEL, Ruhr-Universitaet Bochum, Germany — So far, only single ionization has been considered for the simulation of arc attachments in high intensity discharge lamps.^{1,2} However, it was found (and supported by experiments³) that the electrons reach temperatures where double ionization is not negligibly small anymore for certain conditions. To investigate the effect this has on the arc attachment, we qualitatively include double ionization in the calculation of the so-called transfer functions (namely the heat flux q_p and current density j). These transfer functions are necessary to simulate the arc attachment numerically. In the new transfer functions, ion densities for ions with single and double charge are calculated from an analytical solution of the Saha equations. These densities are used to calculate a reduction of the ion energy caused by the additional energy drain the double ionization process represents. It is however assumed that the ion current is still driven by the singly charged ions. This simplification allows only qualitative results.

¹ L. Darbringhausen *et al.* *J. Phys. D: Appl. Phys.* **38** (2005) 3128

² N. A. Almeida *et al.*, *J. Phys. D: Appl. Phys.* **37** (2004) 3107

³ G. Kuhn and M. Kock, *Phys. Rev. E* **75** 1 (2007) 016406

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