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Preventing transient spots on thermionic cathodes¹

MIKHAIL BENILOV, PEDRO ALMEIDA, MARIO CUNHA, Departamento de Fisica, Universidade da Madeira, Largo do Municipio, 9000 Funchal, Portugal — Transitions between diffuse and spot modes of attachment of a high-pressure arc to a thermionic cathode, provoked by a current jump, are studied by means of a numerical and physical experiment. The numerical simulation is based on the model of nonlinear surface heating, which has become during the last decade a universally accepted tool for modeling arc-cathode interaction. Experiments were performed on COST-529 standard lamps, which are HID lamps with quartz walls and a quartz envelope. The lamps had pure tungsten cylindrical electrodes and operated at pressures of about 4 bar. The power supply to the lamps was provided by a voltage driven power amplifier FM 1295 DCU/I 750, which functioned as a current source and was controlled by an arbitrary waveform generator Agilent 33220A or by an analogue function generator Leader LFG-1300S. A good agreement between the numerical modeling and experimental results was found. A possibility of prevention of formation of transient spots is demonstrated both numerically and experimentally.

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