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Structure of a micro hollow cathode discharge in the normal regime at medium pressure range in pure argon CLAUDIA LAZZARONI, PASCAL CHABERT, ANTOINE ROUSSEAU, CNRS-Ecole Polytechnique, NADER SADEGHI, CNRS, LABORATOIRE DE PHYSIQUE DES PLASMAS TEAM, LABORATOIRE DE SPECTROMETRIE PHYSIQUE TEAM — A microplasma is generated in the 400 μm diameter micro hole of a molybdenum-alumina-molybdenum sandwich (MHCD type) at medium pressure (30-300Torr) in pure argon. Experiments are performed during the normal regime, when the plasma is not only confined in the hole but also expands on the cathode backside. Imaging and emission spectroscopy allows the discharge structure to be studied and is used to infer the electronic density in the micro-hole via the Stark broadening of the H_β line. We find strong maxima of the plasma emission in the vicinity of the sheath edge. To explain some of the experimental observations, we use a one dimensional transport model to obtain the radial evolution of the charged-particles densities and fluxes. The result of this model is used as an input parameter of a sheath-model which allows the sheath thickness to be calculated as a function of pressure. The sheath size variation with pressure is well correlated with the maxima of plasma emission.

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