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Electrical characteristics of TIG arcs in argon from non-equilibrium modelling and experiment MARGARITA BAEVA, DIRK UHRLANDT, Leibniz Institute for Plasma Science and Technology INP Greifswald e.V., Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany, ERWAN SIEWERT, Linde AG, Geschftsbereich Linde Gas, Carl-von-Linde-Str. 25, 85716 Unterschleissheim, Germany — Electric arcs are widely used in industrial processes so that a thorough understanding of the arc characteristics is highly important to industrial research and development. TIG welding arcs operated with pointed electrodes made of tungsten, doped with cerium oxide, have been studied in order to analyze in detail the electric field and the arc voltage. Newly developed non-equilibrium model of the arc is based on a complete diffusion treatment of particle fluxes, a generalized form of Ohms law, and boundary conditions accounting for the space-charge sheaths within the magneto-hydrodynamic approach. Experiments have been carried out for electric currents in the range 5-200 A. The electric arc has been initiated between a WC20 cathode and a water-cooled copper plate placed 0.8 mm from each other. The arc length has been continuously increased by 0.1 mm up to 15 mm and the arc voltage has been simultaneously recorded. Modelling and experimental results will be presented and discussed.

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