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# Temperature investigation of electric arc discharges in medium-voltage switchgear

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The purpose of this study is to investigate temperature profiles of electric arc discharges in a medium-voltage switchgear. This project aims at Validation of simulations of electric arc discharges temperatures. Therefore a simple contact geometry was applied under 150 A and 550 A of alternating current at normal atmosphere. The contacts were made up of both copper and copper-wolfram.

To discover the off-switching process the contact pairs initially were closed. They opened briefly after zero-crossing of the alternating current voltage. A spectrometer was installed orthogonal to the contacts axis. Its space-resolution observed a cross section of the arc discharge in 3 mm distance parallel to the cathode surface. Spectrograms were taken at two points. Firstly at the currents maximum and secondly 1 ms later.

To determine temperatures the Bolzmann-plot method was applied to the intensities of Copper I spectral lines[1] at 510.5541nm and 515.3235nm wavelength. Therefore the broadband spectrogram was analyzed with a sum function of multiple Pseudo-Voigt profiles. Fitting was done via non-linear least square algorithms. The mathematics will be part of this talk.

So far the results of measurements under 150 A alternating current were analyzed. Thus the temperature at the first point in time is investigated to about 14.000 K at its maximum and down to about 8.000 K at the edges of Copper I availability. At the second point in time higher temperatures are estimated. After validation of the off-switching process an experiment concerning the on-switching process is planned.

[1] http://physics.nist.gov/PhysRefData/ASD/lines_form.html

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