Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

Simulation of pre-breakdown discharges in air[1] MIKHAIL BENILOV, NUNO G. C. FERREIRA, DIEGO SANTOS, PEDRO G. C. ALMEIDA, Universidade da Madeira, GEORGE NAIDIS, Institute for High Temperatures of RAS — A unified method of numerical modelling of low-current discharges in high-pressure gases is developed. The method employs, in the framework of a single code, stationary or time-dependent solvers, depending on the discharge being modelled being stationary (e.g., corona or Townsend discharge) or non-stationary (e.g., streamers). Two examples are given. In the first example, the inception voltage of positive corona in air in a wide pressure range was computed and compared with standard experimental data. At high pressures, the inception voltage is appreciably affected by the detachment. The agreement between the modelling and the experiment is very good. In the second example, a discharge in weakly non-uniform electric fields was computed and the inception electric field was compared with experimental data. It is found that field emission from microscopic non-uniformities on the negative electrode comes into play at values of pressure lower than those at which the effect of comparable non-uniformities on the positive electrode comes into play. The dependence of the inception voltage on the air pressure, computed with the account of field emission, reveals saturation with increasing pressure and conforms to the measured dependence of the breakdown voltage on pressure.

[1]The work at UMa was supported by FCT of Portugal (project Pest-OE/UID/FIS/50010/2013).

Mikhail Benilov
Universidade da Madeira

Date submitted: 16 Jun 2018 Electronic form version 1.4