Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Implementation and validation of a cathode directed streamer in air under point to plane electrode configuration. FRANCIS BOAKYE-MENSAH, NELLY BONIFACI, RACHELLE HANNA, OLIVIER LESAINT, Univ. Grenoble Alpes, CNRS, Grenoble INP*, G2Elab, Grenoble, 38031, France — The Gas Insulated Switchgear (GIS) is widely used in electrical networks. Pressurized gas, predominantly SF_6, for several decades has been used as the dielectric insulation medium. Despite its excellent technical capabilities, it is also characterized by a strong global warming potential. Regulations for climate change mitigation have mandated an active search for environmentally friendly alternatives by equipment manufacturers. Research into possible replacement of SF_6, specifically in medium voltage equipment, are well advanced with alternatives like Air, CO_2, HFO-1234ze and solid-gas combos being studied experimentally. Numerically, these studies ought to be complemented by computer models for electrical discharges, dielectric strength, test and withstand voltage study etc. Within this framework, streamer discharges, a non-thermal electrical discharge has been studied in a commercial finite element software. Implementation and validation of streamer models in air for point to plane geometry under different voltage stresses and pressures have therefore been done in COMSOL^{TM}Multiphysics using the plasma module. Results of simulations for short gaps ($\leq$ 5 mm) under standard temperature conditions have been analysed and the suitability of such a model for further studies of electrical discharges assessed. This model is the starting point of developing an analytical model for discharges in gaseous and hybrid insulation leading to dielectric breakdown.

Francis Boakye-Mensah
Univ. Grenoble Alpes, CNRS, Grenoble INP*, G2Elab, Grenoble, 38031

Date submitted: 22 Apr 2020 Electronic form version 1.4