

Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Propagation of a positive streamer discharge along a dielectric rod¹ ANNA DUBINOVA, UTE EBERT, JANNIS TEUNISSEN, Centrum Wiskunde & Informatica — We simulate positive streamer discharges developing in artificial air near dielectric and conductive materials. This research is important, for example, in the high voltage technology where surface flashovers are to be avoided. We designed an axially symmetric model in which a positive streamer develops at the tip of the needle electrode (parameterized as a spheroid) and propagates towards and then along a dielectric rod (a cylinder). Our model includes field modification due to the polarization effect, photoionization, charge accumulation on the dielectric surface and photoelectron emission. We describe a numerical method (a generalized Ghost Fluid Method) which allowed us to include dielectric interfaces into our streamer model, in an accurate and fast manner. Finally, we measure the velocity of a positive streamer propagating along the dielectric rod and compare it with experiments. We discuss the importance of the surface photoelectron emission as an intrinsically non-local source of free electrons for streamer propagation.

¹The work is supported by the STW project 12119, partly funded by ABB.

Anna Dubinova
Centrum Wiskunde & Informatica

Date submitted: 13 Jun 2014

Electronic form version 1.4