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Modeling DC-circuit-breakers for long distance electricity transmission ASHUTOSH AGNIHOTRI, Centrum Wiskunde en Informatica, Amsterdam, UTE EBERT, Centrum Wiskunde en Informatica, Amsterdam & Eindhoven University of Technology, Eindhoven, WILLEM HUNDSDORFER, Centrum Wiskunde en Informatica, Amsterdam & Radboud University, Nijmegen — Modeling a circuit-breaker is a multiple timescale problem which involves a cascade of physical processes from avalanche phase to streamer, spark and post discharge phase, with a transition phase between each pair of processes. In particular, Jin Zhang and Bert van Heesch at Eindhoven University of Technology investigate now whether the conventional SF6 can be replaced by supercritical nitrogen. We focus on modeling space charge effects, gas heating and secondary electron emission from cathode. We develop a two-dimensional drift-diffusion model for streamers coupled to the Euler equations for the gas to study the related phenomena. We perform simulations to capture thermal shocks and induced pressure waves caused by the electrical breakdown of the surrounding gas. We include heat exchange mechanisms between the electrons/ions and the surrounding gas.

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