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2D Particle in cell simulations of simultaneous positive and negative streamer propagation of a twin surface dielectric barrier discharge¹ RYAN T. NGUYEN-SMITH, Ruhr Univ Bochum, QUAN-ZHI ZHANG, Dalian University of Technologoy, PETER AWAKOWICZ, JULIAN SCHULZE, Ruhr Univ Bochum — In this work, the propagation mechanisms of plasma streamers are studied on a twin surface dielectric barrier discharge (SDBD) in air under atmospheric pressure using 2D particle in cell simulations. The physical SDBD has two exposed and symmetric electrodes separated by a single dielectric barrier allowing for positive and negative streamers to ignite simultaneously. In order to determine the interactivity of the two streamers, the propagation behavior for the positive and negative streamers are investigated both independently and simultaneously under identical constant voltage conditions. Furthermore, a heavy focus of an alternating voltage waveform is also considered, thereby investigating the large dynamics of the streamers under alternating voltage polarities. It is shown that the simultaneous ignition of both streamers as well as the alternating voltage leads to discharge enhancement and increased surface coverage. It is also shown that additional streamer branches covering the metallic electrode may occur. The enhanced discharge and surface coverage may be beneficial in many SDBD applications including but not limited to flow control, air purification, plasma enhanced catalysis, and removal of volatile organic compounds from exhaust gasses.

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