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Breakdown of atmospheric pressure microgaps at high excitation frequencies[1] DMITRY LEVKO, LAXMINARAYAN RAJA, The University of Texas at Austin — Microwave breakdown of atmospheric pressure microgaps was studied by a one-dimensional Particle-in-Cell Monte Carlo Collisions numerical model. The effect of both field electron emission and secondary electron emission (due to electron impact, ion impact, and primary electron reflection) from surfaces on the breakdown process is considered. For conditions where field emission is the dominant electron emission mechanism from the electrode surfaces, it is found that the breakdown voltage of mw microdischarge coincides with the breakdown voltage of direct-current microdischarge. When microdischarge properties are controlled by both field and secondary electron emission, breakdown voltage of mw microdischarge exceeds that of dc microdischarge. When microdischarge is controlled only by secondary electron emission, breakdown voltage of mw microdischarge is smaller than that of dc microdischarge. It is shown that if the interelectrode gap exceeds some critical value, mw microdischarge can be ignited only by electrons initially seeded within the gap volume. In addition, the influence of electron reflection and secondary emission due to electron impact is studied.

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