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Fluid modelling of the influence of the pulse width in N2-O2 barrier discharges M.M. BECKER, R. BRANDENBURG, H. HÖFT, M. KETTLITZ, D. LOFFHAGEN, INP Greifswald — Recently, experimental investigations on pulsed driven dielectric barrier discharges in N2-O2 gas mixtures at atmospheric pressure have revealed that the time between subsequent microdischarges influences the discharge characteristics significantly (M. Kettlitz et al., J. Phys. D: Appl. Phys. 45:245201, 2012). Here, the influence of the pulse width in the range from 5 to 50 μs on the particle densities and on the most important reaction kinetic processes in a gas mixture of 0.1 vol% O2 in N2 is analysed. The studies are performed by means of a time-dependent, spatially one-dimensional fluid model taking into account balance equations for the densities of all relevant species and the mean electron energy, Poisson's equation as well as an equation for the surface charge density on the dielectrics. It is shown that in accordance with measurements the model predicts different current-voltage characteristics at the rising and the falling slope of the voltage pulse if the duty cycle is decreased from 50% to 10%. With decreasing pulse width the current maximum at the falling slope also decreases. It is confirmed by the theoretical investigations that for short pulse widths the charge carriers left in the gap play an important role in the reignition dynamics.

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