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High-Voltage Nanosecond Pulse Action on RF Discharge LEONID VASILYAK, Joint Institute for High Temperatures, Russian Academy of Sciences, Moscow, MIKHAIL PUSTYLNIK, Max-Planck-Institut fur Extraterrestrische Physik, Garching, Germany, LUJING HOU, ALEXEI IVLEV, Max-Planck-Institut fur Extraterrestrische Physik, Germany, LENAIC COUEDEL, Aix-Marseille-Universite, France, HUBERTUS THOMAS, GREGOR MORFILL, Max-Planck-Institut fur Extraterrestrische Physik, Germany, VLADIMIR FORTOV, Joint Institute for High Temperatures, Russian Academy of Sciences — After the discharge of atmospheric lightning from cloud to the ground the space electric charge appears. We investigated experimentally similar situation in a short discharge gap. A high-voltage (3-17 kV) 20 ns pulse was applied to the weakly-ionized RF discharge. The plasma evolution exhibits two regimes: a bright flash, occurring within 100 ns after the pulse, and a dark phase, lasting a few hundreds microseconds. Electron density increased during the flash remains high during the dark phase. 1D3V particle-in-cell simulation was made. The high-voltage nanosecond pulse is found to be capable of removing a significant fraction of plasma electrons out of the discharge gap. The flash is the result of the excitation of gas by the electron in the residual electric field of the bulk positive charge. High density plasma formed during the flash provides screening of the steady-state RF field, which leads to the electron cooling and, hence, a dark phase.

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