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Mechanism of fast gas heating in a non-equilibrium weakly ionized air discharge plasma at high electric fields NICKOLAY ALEKSANDROV, SVETLANA KINDYSHEVA, MARYA NUDNOVA, Moscow Institute of Physics and Technology, ANDREY STARIKOVSKIY, Drexel University — Observations of a shock wave propagating through a decaying plasma in the afterglow of an impulse high-voltage nanosecond discharge and of a surface dielectric barrier discharge in the nanosecond range are analyzed to determine the electron power transferred rapidly into heat in air plasmas at high electric fields. It is shown that around a half of the discharge power can go to heat for a short (< 1 μs) period of time when reduced electric fields are about 10^3 Td. A kinetic model is developed to describe the processes contributing to the fast transfer of electron energy into thermal energy under the conditions considered. Calculations based on the model developed agree qualitatively with the analysis of the observations in the high-voltage nanosecond discharges.

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