Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Temporal evolution of the electron density produced by nanosecond repetitively pulsed discharges in water vapor at atmospheric pressure
FLORENT SAINCT, DEANNA LACOSTE, EM2C laboratory, MICHAEL KIRKPATRICK, EMMANUEL ODIC, Supelec-E3S, CHRISTOPHE LAUX, EM2C laboratory — A study of plasma discharges produced by nanosecond repetitive pulses (NRP) in water vapor at 450 K and 1 atm is presented. The plasma was generated between two point electrodes with 20-ns duration, high-voltage (0-20 kV) pulses, at a repetition frequency of 10 kHz, in the spark regime (2 mJ/pulse). Atomic lines measured by optical emission spectroscopy were used to determine the electron number density in this non-equilibrium water-vapor plasma. The broadenings and shifts of the H_α and H_β lines of the hydrogen Balmer series and of the atomic oxygen triplet at 777 nm were analyzed. For a maximum reduced electric field of about 200 Td, a maximum electron density of 2 x 10^{18} cm^{-3} was measured, corresponding to an ionization level of about 10%. This ionization level is two orders of magnitude higher than the one obtained for similar NRP discharges in air at atmospheric pressure.

Florent Sainct
EM2C laboratory

Date submitted: 13 Jun 2014 Electronic form version 1.4