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Characterization of atmospheric nanosecond discharge under highly inhomogeneous and transient electric field in air/water mixture
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— We report the studies of a centimeter range pin-to-plane nanosecond repetitively discharge (<30 ns and 10 Hz) in standard conditions of pressure and temperature under very high positive voltage pulses (20 to 100 kV). In these typical conditions, plasma exhibit unusual diffuse and large structure. This kind of discharge is not well understood and in first approach, it requires (i) a description of plasma dynamic and (ii) behavior under relevant context (environmental issues ...) using pertinent gas (humid air). Thus, we will first present sub-nanosecond imaging of the discharge obtained for typical conditions of stabilized plasma. Then we will focus on determination of rotational and vibrational temperature (OES) and preliminary results concerning the production and evolution of OH radical in temporal post-discharge in air/water mixture (PLIF). Theses spectroscopic measurements are undertaken as function of most influent parameters, *i.e.* voltage pulses features (amplitude, rise time and length) and water concentration.

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