Abstract Submitted
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Study of micro-EDM plasmas[1] I.M.F. BRAGANCA, P.A.R. ROSA, DEM/IST-UTL, Portugal, F.M. DIAS, L.L. ALVES, IPFN/IST-UTL, Portugal — Micro Electrical Discharge Machining (micro-EDM) is a plasma-assisted process for the manufacturing of micro-components in high-hardness conductive materials. The removal of material is the result of a sum of dc discharges, produced within a point to plane system of electrodes immersed in a dielectric fluid, whose electric disruption with the development of plasma-currents can be induced by imposing a threshold voltage. To better understand the interaction between the micro-plasma and the material, we have designed and build an experimental setup for the production of single-discharges, characterized by a constant voltage-current operation point. The device allows the ignition of resistive plasmas in air/water at different pulse-times ($\sim$100–3200 μs), currents ($\sim$1-20 A for $\sim$75-250 V), polarities and gap-sizes ($\sim$0,5-25 μm), and the changes in these work conditions can be correlated to the type and size of the craters produced. The micro-plasma electron density n_e is measured using the Stark broadening of the H_α atomic line. First results give $n_e \sim 10^{16}$ – 10^{17} cm^3, in agreement with estimates obtained from an electrical circuit model of the discharge.

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L.L. Alves
IPFN/IST-UTL

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