Experimental investigations of electrical properties and gas temperature of spark plug discharge.

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Currently there is great interest in optimizing automotive engines in order to reduce fuel consumption, reducing pollutants released into the atmosphere. This work focuses on the investigation of processes occurring during the ignition of plasma and its consequences in post-discharge for an internal combustion engine, especially considering the spark plug discharge, aimed at finding the proper parameters to be applied in cars that operate on "poor mixtures". The experimental setup was developed in order to simulate the discharges generated in spark plug. The system is based on a synchronic circuit, an ignition coil and the spark plug. The synchronic circuit produces pulses that yield an ignition coil which in turn induces high voltages that consequently, create controlled discharges in a spark plug. These discharges were characterized in terms of electrical properties from a high resolution oscilloscope. Voltages and currents were measured according to the applied pulses. The peak voltage values were found to be around 5 kV and the peak current values were found to be around 3 A. From a monochromator equipped with a CCD the second positive system emission of nitrogen was recorded and compared with a synthetic spectrum. In this way the rotational temperature was determined according to the applied pulses and as function of time, these temperatures were found to be around 1500 K. This rotational temperature is representative of gas temperature due to the quasi-equilibrium between rotational and translation energies.

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