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Kinetic Model of a Nanosecond Afterglow in Air SARA ABBATE, DENIS PACKAN, ALAIN BROC, ONERA, CHRISTOPHE LAUX, Ecole Centrale Paris — In recent decades an active interest has been shown for applications of non equilibrium plasmas to combustion. Many laboratories in Europe, US and the former Soviet Union have achieved combustion improvements by using plasma technologies, in particular nanosecond discharges due to their energy-efficient excitation of mixtures. Major effects have been noticed in the reduction of the delay time of combustible mixtures, along with auto ignition and stabilisation of flame in lean mixtures. Different mechanisms have been proposed in the literature to explain the observed effects and to build on the experiments, but a complete understanding of the principles is still lacking. The aim of our work is to develop a tool for the numerical simulation of the discharge and after-glow phenomena in a pulsed discharge scheme, with an emphasis on kinetics and plasma phenomena, in order to understand the role of plasmas in the combustion processes. Since recent experiments have demonstrated the fundamental role played by electronically and vibrationally excited air species to enhance combustion [1], we develop a complete vibrationally-specific kinetic scheme in air environment. The kinetic model is validated by mean of experimental measurements. [1] G. Pilla, C. Laux PhD Thesis 21/01/08

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