Abstract Submitted
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Laser induced plasma in hydrogen-air mixtures.[1] ALBINA TROPINA, Texas AM University, MIKHAIL SHNEIDER, Princeton University — Dual-pulse laser ignition in hydrogen-air mixtures at atmospheric pressure conditions was studied numerically. A two dimensional three-temperature plasma model was developed, which includes transport equations for neutral components of the mixture, electrons, molecular and atomic hydrogen ions in the ground state combined with equations for the electronic, vibrational and translational temperatures and Navier –Stokes equations for the compressible gas. Analysis of different kinetic schemes and ignition delay time dependence on the initial ionization level have been carried out, taking into account a multi-photon ionization of hydrogen molecules by the first ultraviolet laser pulse, avalanche ionization by the second near-infrared laser pulse and formation of excited states of oxygen. The results allow us to understand the role of chemistry, hydrodynamics phenomenon, vibrational non-equilibrium and energy exchange mechanisms in facilitating ignition by the dual-pulse laser in the hydrogen-air mixture.

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