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Vibrational Kinetics of Electronically Excited States in H_2 Discharges GIANPIERO COLONNA, LUCIA DANIELA PIETANZA, Plasmi Lab CNR Nanotec Bari, ROBERTO CELIBERTO, DICATECh, Polytechnic of Bari and Plasmi Lab CNR Nanotec Bari, MARIO CAPITELLI, ANNARITA LARICCHIUTA, Plasmi Lab CNR Nanotec Bari — The StS model of hydrogen plasmas has been improved, including in the kinetic scheme the vibrational levels of the relevant electronically excited singlet terms, responsible for the H_2 spectral emission, and correspondingly the vibrationally-resolved cross sections and the radiative decay coefficients, describing the de-excitation dynamics. Also the triplet state evolution resulting from the competition between the collisional quenching and the predissociation mechanism, both leading to dissociation, is considered. This model has been applied to repetitively pulsed nanosecond discharges. The evolution of the molecule, including excited states, atomic hydrogen and ionic species molar fractions is shown during the pulse and compared with the results obtained neglecting either the vibrational kinetics or the collisional quenching of excited singlets. The differences are discussed in the light of the modifications of the shape of the eedf and ground state vibrational distribution function, emphasizing the role of quenching at the pressures considered in the simulation. The model could be validated in low-pressure regimes, missing experimental results in high-pressure discharges.

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