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Enhancement of burning velocity by dissociated oxygen atoms¹

HARUAKI AKASHI, TOMOKAZU YOSHINAGA, Dept. Appl.Phys., National Defense Academy, Japan, KOICHI SASAKI, Div. Quantum Sci. Eng., Hokkaido University — Green technology, such as preventing global warming, has been developed for years. Researches on plasma assisted combustion is one of the technologies and have been done for investigating more efficient combustion, more efficient use of fossil fuel with plasmas or applying electric fields. In the ignition time delay analyses with the dissociated oxygen atoms which is generated by non-equilibrium plasma had significant effect on the ignition time. In this paper, dissociated oxygen could effect on burning velocity or not has been examined using CHEMKIN. As a result, no effect can be seen with dissociation degree of lower than 10^{-3} . But there is an effect on the enhancement of burning velocity with higher degree of 10^{-3} . At the dissociation degree of 5×10^{-2} , the burning velocity is enhanced at a factor of 1.24. And it is found that the distributions of each species in front of preheat zone are completely different. The combustion process is proceeded several steps in advance, and generation of H_2O , CO and CO_2 can be seen before combustion in higher dissociation case.

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