

Abstract Submitted
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Modeling of electron behaviors under microwave electric field in methane and air pre-mixture gas plasma assisted combustion¹ HARUAKI AKASHI, Dept. Appl. Phys., NDA, K. SASAKI, Hokkaido Univ., T. YOSHINAGA, Dept. Appl. Phys., NDA — Recently, plasma-assisted combustion [1] has been focused on for achieving more efficient combustion way of fossil fuels, reducing pollutants and so on. Shinohara et al [2] has reported that the flame length of methane and air premixed burner shortened by irradiating microwave power without increase of gas temperature. This suggests that electrons heated by microwave electric field assist the combustion. They also measured emission from 2nd Positive Band System (2nd PBS) of nitrogen during the irradiation. To clarify this mechanism, electron behavior under microwave power should be examined. To obtain electron transport parameters, electron Monte Carlo simulations in methane and air mixture gas have been done. A simple model has been developed to simulate inside the flame. To make this model simple, some assumptions are made. The electrons diffuse from the combustion plasma region. And the electrons quickly reach their equilibrium state. And it is found that the simulated emission from 2nd PBS agrees with the experimental result.

[1] V.Bychkov et al., IEEE Trans. Plasma Sci.,37,12 2280-2285(2009)

[2] K.Shinohara et al, J.Phys.D:Appl.Phys., 42, 182008 (1-7) (2009).

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