

Chemical effect of hydrogen peroxide addition on characteristics of
methane-air combustion(102.07.28-102.08.02)

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Abstract

The effects of hydrogen peroxide addition on the reaction pathway of premixed methane/air flames are numerically investigated using the PREMIX code with the GRI-Mech 3.0 chemical kinetic mechanisms and detailed transport properties. Hydrogen peroxide is used as the oxidizer substituent of air. Results show that the laminar burning velocity and adiabatic flame temperature of premixed methane-air flame are significantly increased with H₂O₂ addition. The addition of hydrogen peroxide increases not only all the reaction rates of intermediate species, but also the concentrations of intermediate species. The traditional reaction pathways of CH₄/air flame are altered by the addition of hydrogen peroxide, due to the enhanced production of OH and H₂O₂. The enhanced OH radicals promote H₂O₂ productions through reaction (R85). The increased H₂O₂ accelerates the progressive reaction of CH₃ to form CH₃O and then CH₂O.

Keyword : Hydrogen peroxide, chemical pathway, laminar burning velocity, adiabatic flame temperature,