固體火箭預混火焰誘導聲波振盪之研究

This research is concerned with the study of sound generation by simulated solid rocket premixed flames located on the sidewall of a long rectangular duct. Specifically, the flame radiation, i.e., light emission, of the flame and the induced acoustic oscillation were investigated. These studies reveal that the self-excited oscillatory flame radiation and the induced pressure oscillation were observed only at certain equivalence ratios. In addition, the flame oscillates with several frequencies and the dominating frequency can be different from that of the induced pressure oscillations. The frequencies of the flame oscillation decreased as the equivalence ratio decreased, and were not affected by the presence of acoustic wave. However, the acoustic oscillations could be enhanced or damped by the flame oscillation depending on the frequency of the oscillations. Driving of acoustic wave occurred when the frequencies of the induced acoustic wave are close to the harmonics of the experimental duct. On the other hand, the acoustic oscillations were damped when the frequencies of the pressure oscillations are away from the harmonics of the duct.