

IAF SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES (D6)  
Commercial Spaceflight Safety and Emerging Issues (1)

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## ACOUSTICS ASSISTED FIRE PROPAGATION

**Abstract**

Through proper experimentation, the effect of sound on spreading of flames is investigated in the aid of spread rate. Sound energy as a wave is always accompanied by compression and rarefaction. As an external influence, sound in the immediate vicinity of spreading flame can affect the flame spread rates. The present work is motivated by the superior standards of fire safety from practical and functional significance as it covers wide range of engineering and industrial applications. The role of sound is detailed by means of enhanced understanding of the mechanisms which control the spread rates under different operating conditions and key controlling parameters. Appreciable work had been carried out however, effect of sound on flames in purely natural convective environment is an aspect yet to be thoroughly understood. Flame spread rate is a direct implication of forward heat transfer from burning to non-burning region. Presence of sound wave will result in formation of localized pressure and velocity fields around the pilot fuel, which are expected to affect the forward heat transfer. The changes in heat transfer will be reflected in spread rates increment or decrements in comparison to the one without sound. The present work attempts physical insight into the effect of sound frequency and sound source distance on spreading of flames in opposed and concurrent configurations. An experimental setup was upraised comprising of a sound source with essential controls. The location and frequency of sound source is systematically varied keeping the ignition front fixed. Optimal conditions in terms of sound source location, frequency, orientation of fuel are investigated for applications needing fast spreading and flame extinction