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IAF SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES (D6)
Enabling safe commercial spaceflight: vehicles and spaceports (3)

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ROLE OF THERMOACCOUSTIC COUPLING WITH EXTERNAL HEAT SOURCE ON POTENTIAL PROPULSIVE FIRES

Abstract

Space propulsion mandates the necessary understanding of fires. The subject is entitled to research emphasis owing to resources, mission safety and adjoined huge financial losses.

IIncombustion, adiffusion flameis aflamein which theoxidizercombines with thefuelbydiffusion.In several Aerospace and Automobile industries combustion by diffusion flames are used. Almost all of the combustion processes are accompanied by sound which significantly affects its progression . In a combustion chamber of a jet engine combustion of fuel takes place in several cans which are at a particular distance and orientation to the other,so to understand the effects it is necessary to understand the effect of Thermoacoustic coupling on diffusion flame .Acoustic effect coupled with external heat source is an aspect yet to be explored .The present work represents practical case where combustion phenomenon is accompanied with external heating and acoustics .The work attempts to gain physical insight into acoustic and thermal energy interaction .To study the effects, an experimental setup consisting of a wax candle with external heat source coupled with sound source was upraised. The effect of systematic variation of external heat source distance and orientation ,with respect to the fuelwithout the presence of acoustic andthen with acoustics at different frequencies and orientations, were studied.From this experiment an alteration in the regression rate of the candle was noted.The results of the experiment can be utilised to increase fire safety and a better combustion process.Potential fires represent combustion primarily studied as adiffusion flamein which theoxidizercombines with thefuelbydiffusion with applications in Aerospace and Automobile industries combustion. Almost all of the combustion processes are accompanied by sound which significantly affects its progression. In space Propulsion, combustion is in vicinity of external sources and always assisted by acoustics.Acoustic effect coupled with external heat source is an aspect yet to be explored .The present work represents practical case where combustion phenomenon is accompanied with external heating and acoustics.The work attempts to gain physical insight into acoustic and thermal energy interaction.To study the effects, an experimental setup consisting of a wax candle with external heat source coupled with sound source was upraised. The effect of systematic variation of external heat source distance and orientation with respect to the fuelwith acoustics at different frequencies and orientations, were studied.The results can be utilised to increase fire safety and a better combustion process.