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Effects of Thermoacoustic Coupling with External Heat Source on Diffusion Flames

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In combustion, a diffusion flame is a flame in which the oxidiser combines with the fuel by diffusion. 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 fuel without the presence of acoustic and then 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.

Biography

Pratik Sarkar, Jayaraj Chaudhary and Aanchal Gupta are undergraduate students from Department of Aerospace engineering at SRM Institute of Science and Technology, India. They are in their third year of study.

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