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Author: Mr. Vinayak Malhotra
SRM University Chennai, India

Mr. GAUTAM KUMAR
SRM Institute of Science and Technology, India

ROLE OF ACOUSTICS ON UNSTABLE FIRE PHENOMENON IN SPACE PROPULSION

Abstract

Combustion forms the most reliable and basic form of propulsion for ground and space applications. In the last century, the research efforts for better understanding of combustion to enhance utilization have remarked the essence. A large part of Immense success in space exploration can be attributed to the enhanced understanding of combustion phenomenon. The generation of large amount of energy from a small volume relates mostly to the flaming combustion. Flaming incorporates gaseous phase reaction surrounding the fuel as flames which have made space propulsion possible and at the same time is the source of biggest disasters. Benchmark research efforts have stated that system acoustics have significant influence on the combustion process. On records, yearly loss of one billion dollars to the aerospace industry throughout the world represents a problem of practice and functional importance. Present work attempts to address the imperative issue of heterogeneous fire phenomenon using acoustic effects on unstable premixed flames. Systematic experiments are conducted on lifted flame using butane gas lighters surrounded by impinging acoustics. The flame behavior is noted under varying conditions of flow rate, acoustic parameters viz., frequency, source distance. The work addresses combustion instabilities involving lifted premixed flames. The present work is expected to offer good physical insight into the system induced acoustics, it's effect on combustion process for ground and Space Propulsion domain.