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GENERALIZATION OF PERFORATED FORCED CONVECTION HEAT TRANSFER AND IMPLICATIONS ON AEROSPACE PROPULSION SYSTEMS

Abstract

Aerospace propulsion is a modulated application of combustion with heat transfer as an imperative aspect and a pertinent issue to resolve. Present work attempts to optimize perforated forced convection heat transfer for effective space propulsion. Systematic Lab scale experiments are carried out on a square flat plate and, the role of perforated enclosure(s) on confined forced convective heat transfer for varying flow speeds is investigated. The effect and the extent of effect, of diverse perforation shapes and sizes on heat transfer rates is scrutinized. The resultant phenomenon is articulated in terms of deviation in heat transfer coefficient.The role of controlling parameters viz., perforation type,size, plate orientation,and perforated enclosures in distinct configurations is probed for wide-ranging applications.

Results as of now indicate that, distinct perforated enclosures have distinct and significant effect on the transportation of heat under varying conditions. Flow behavior with the respective variations is understood to play formidable role in energy transference. Smoother surfaces are useful in conservation of heat and with increasing surface orientation becomes more effective in transfer of heat. To simplify the heated surface orientation and related heat transfer analysis, an adaptive heat transfer system with provision for optimized heat transfer is proposed.