

UNSTEADY HEAT TRANSFER ENHANCEMENT IN A 3-D RECTANGULAR DUCT USING SYNTHETIC JET ACTUATOR

Mohammad Moshfeghi^{*}, Byung Ha Kang^{**}, Jaisuk Yoo^{***} and Nahmkeon Hur^{****§}

^{*}Multi-Phenomena CFD Engineering Research Center, Korea

^{**}School of Mechanical Systems Engineering, Kookmin University, Seoul, Korea.

^{***}Department of Mechanical Engineering, Ajou University, Suwon, Korea

^{****}Department of Mechanical Engineering, Sogang University, Seoul, Korea

[§]Correspondence author. Fax:+82 2 713 8637 Email: nhur@sogang.ac.kr

ABSTRACT Any mechanism for changing the mixing process and instability inside the boundary layer and the replacement of hot fluid adjacent to wall surface with cold fluid from bulk flow affects the heat transfer efficiency. Hence, synthetic jet actuators (SJAs) have become popular for heat transfer enhancement projects. In a SJA system, frequency of the injection is an important factor. This paper first studies the effects of frequency of the SJA on a heat transfer enhancement in a 3D rectangular duct. In another part, the effects of hybrid injection are also investigated. The unsteady CFD simulations are carried out using SST-k- ω turbulence model. The comparisons are presented in terms of turbulence intensity, streamline and temperature distribution.