

The effect of orifice shape on convective heat transfer of an impinging synthetic jet

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Abstrak

A greater heat load due to the miniaturization of electronic products causes the need for a new cooling system that works more efficiently and has a high thermal capacity. A synthetic jet is potentially useful for the cooling of electronic components. This paper reports the results of our experimental studies and the influence of orifice shape for Impinging Synthetic Jet cooling performance. The effect of shape of the orifice of an impinging synthetic jet assembly on the apparatus cooling of a heated surface is experimentally investigated. It will be seen that the characteristics of convective heat transfer will occur by moving the piezoelectric membrane. The prototype of the synthetic jet actuator is coupled with two piezoelectric membranes that operate by 5 volt electrical current and create a sinusoidal wave. The orifice shapes considered are square and circular. The results show the significant influence of orifice shape and sinusoidal wave frequencies on the heat transfer rate that were obtained. The temperature drop with a square orifice is found to be larger than that with circular shapes. A square orifice has a larger covered area if compared to the circular orifice at the same radius, thus resulting in a larger entrainment rate that leads to an increase of heat transfer performance.