The effect of frequency excitation and cavity shape changes on the vortex ring formation of a synthetic jet actuator

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Abstrak

This paper provides an explanation of the effects of cavity shape and frequency excitation to the vortex formation of the synthetic jet. In order to get comprehensive results, this study will be conducted by both computational and experimental methods.The experiment method prepared by applying hotwire probe on the center point of the synthetic jet orifice, so from here the researcher get the Ux (average airflow velocity from membrane movement)in a low voltage signal, then the data will be transferred to analog data converter within the record speed 10.000 data/s. The cavities shapes that will be applied are half-sphere, tubes, and conical. The diameter varieties of the orifice are 3 mm, 5 mm and 8 mm. the simulation is started by utilizing the flow rate data from the experiment which can be put in the simulation boundary condition. Furthermore, from visual data of flow contour from CFD simulation the qualities vortex ring formation from SJA can be determined. Based on this research result, the formation of vortex ring occurs at the configuration B3, T3, T5, K3 and K5 of the SJA. Meanwhile, the other types of the synthetic jet cavity which have 8 mm of orifice diameter is not producing the vortex ring.