Effect of Vaned Diffuser on the Performance of Small Turbocharger
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This work presents an experimental investigation of performance of small turbocharger compressor with vaned diffuser. The aim of the study is to investigate the effect of number vaned diffuser on peak pressure ratio in turbocharger. The study was carried out using cold-flow turbocharger test rig driven by compressed air with the impeller rotational speed from 40,000 to 70,000 rpm. Tests were conducted with 6, 8 and 10 number of vanes while maintaining the vane blades angle of 6°, turning angle of 30° and blade length of 21.8 mm. The vanes as a flow deflector were designed as a thin flat plate of 1 mm thickness. All the results were compared with original vaneless diffuser of the compressor. The results found that the proposed design of 6 and 8 vanes shifted the peak pressure ratio toward low mass flow rate region. It was observed that modification from conventional vaneless diffuser compressor to the one equipped with vaned diffuser has significant improvement on the overall pressure ratio of the turbocharger.