CFD INVESTIGATION ON THE THREE-DIMENSIONAL FLOW CHARACTERISTICS OF PULSATING EXHAUST GAS INSIDE THE MUFFLER

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Abstract

Design of muffler system strongly influences engine efficiency and noise level. Hence, comprehension of flow characteristics inside muffler system is very important. In this study, numerical study of three-dimensional steady and unsteady compressible flow inside muffler system attached to 4-cylinder engine was performed to identify the flow characteristics. To obtain the boundary conditions for numerical analysis, experimental measurement was also performed in the chassis dynamometer under real engine operating conditions. The computational grid generation was carried out and RNG $k-\varepsilon$ turbulence model was applied for considering the complex turbulent fluid motion. Three-dimensional steady and unsteady flow fields of velocity distribution, turbulent kinetic energy, and pressure loss were examined. From the result of this study, we could visualize the flow pattern inside the muffler and found that pressure loss heavily depends on the variation of the flow direction. It is found good agreement within 6% of the measured values.

Key Words: Muffler, Grid generation, RNG $k-\varepsilon$ turbulence model, Pressure loss

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