CFD Analysis of Gas Exchange Process in a Motored Small Two-stroke Engine

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The major shortcoming namely short-circuiting of fresh charge into atmosphere of a two-stroke engine has been correlated to the spatially and temporally changing in-cylinder velocity patterns. In a small engine, modifications in the cylinder head for carrying out experiments to investigate the gas exchange phenomenon become extremely difficult. CFD study offers the effective alternative for such investigations and this study has been undertaken to develop a model using a commercial CFD code STAR-CD and study the gas exchange process in a small 100 cc SUZUKI two-stroke engine. The geometric model has been created using GAMBIT, a preprocessor for mesh creation initially and importing it into the STAR-CD environment. Further development of the geometric and simulation model is carried out by the in-built facilities of STAR-CD. The comprehensive CFD model consists of the clearance and displacement volumes of the cylinder, a right-cylinder shaped equivalent crankcase volume, scavenge and booster and exhaust ports and passages. The model study has been successful in providing predictions for crankcase pressures and port passage velocities comparable to the experimental results obtained by FLDV measurement techniques on a similar production line 100 cc SUZUKI crankcase scavenged 2-stroke engine. The details of the comparison between CFD predictions and experimental results have been presented.

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