
NUMERICAL INVESTIGATION ON COMBUSTION CHARACTERISTICS OF BOTH DIESEL AND DUAL FUEL ENGINE AT PART LOAD CONDITIONS USING CONVERGE CFD SOFTWARE

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Abstract

Petroleum resources are finite and, therefore, search for their alternative non-petroleum fuels for internal combustion engines is continuing all over the world. Moreover, gases emitted by petroleum fuel-driven vehicles harm the environment and human health. Dual-fuel engine (diesel/NG) represents one of a possible solution to reduce emissions from a diesel engine. Therefore, this method has been given a lot of attention from many researchers to improve engine performance and reduce diesel consumption, particularly at full loads. However, it is necessary to study the dual-fuel (DF) combustion process with more details at part loads, due to the poor performance at these conditions. This study numerically investigated the effect of DF (dual fuel) operating mode on combustion characteristics of an existing diesel engine using natural gas as primary fuel and neat diesel as pilot fuel at part loads by adopting a 3D-CFD simulation using the code CONVERGE. A series of numerical simulations were carried out, the purpose of which to gain a better understanding of the combustion behavior in dual-fuel engines. The results are first validated using experimental data. A comparison with neat diesel fuel operation is achieved.

Keywords: Dual, fuel Diesel engine, Natural gas, Combustion characteristics, Computational fluid dynamics, CONVERGE CFD.

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