

عنوان مقاله:

Toward an Improvement of Natural Gas-diesel Dual Fuel Engine Operation at Part Load Condition by Detail CFD Simulation

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خلاصه مقاله:

Natural gas-diesel dual fuel combustion is a beneficial strategy for achieving high efficient and low emissions operation in compression ignition engines, especially in genset application heavy duty diesel engine at rated power. This study aims to investigate a dual fuel engine performance and emissions using premixed natural gas and early direct injection of diesel fuel. Due to the different reactivities of natural gas and diesel fuels, the mentioned dual fuel combustion is based on reactivity controlled compression ignition (RCCI) which is introduced within the cylinder. A six-cylinder direct injection (DI) diesel engine was properly modified to run on dual-fuel mode. Based on experimental study, comparative results are given for various operating modes; conventional diesel mode, conventional dual-fuel mode, and RCCI mode; revealing the effect of combustion mode on performance and emission characteristics in a compression ignition engine. The results show that the conventional dual fuel combustion reduces nitrogen oxides (NO_x) emissions but suffers from higher carbon monoxide (CO) and unburned hydrocarbon (HC) emissions in compared to conventional diesel mode at part load condition. Results of detailed assessment of different dual fuel modes with CFD model coupled with chemical kinetic mechanism revealed that RCCI strategy led to higher combustion efficiency as well as lower HC and CO emissions compared to conventional dual fuel combustion at part load condition.

کلمات کلیدی:

Reactivity Controlled Compression Ignition Combustion, Natural gas, Diesel, CFD Simulation Coupled with Chemical Kinetic

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