

Technical and Environmental Improvement of LNG Carrier's Propulsion Machinery by Using Jatropha Biao Diesel Fuel

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Abstract : The rapid depletion of petroleum reserves and rising oil prices has led to the search for alternative fuels. A promising alternative fuel Jatropha Methyl Ester, JME, has drawn the attention of researchers in recent times as a high potential substrate for production of biodiesel fuel. In this paper, the combustion, performance and emission characteristics of a single cylinder diesel engine when fuelled with JME, diesel oil and natural gas are evaluated experimentally and theoretically. The experimental results showed that the thermal and volumetric efficiency of diesel engine is higher than Jatropha biodiesel engine. The specific fuel consumption, exhaust gas temperature, HC, CO₂ and NO were comparatively higher in Jatropha biodiesel, while CO emission is appreciable decreased. CFD investigation was carried out in the present work to compare diesel fuel oil and JME. The CFD simulation offers a powerful and convenient way to help understanding physical and chemical processes involved internal combustion engines for diesel oil fuel and JME fuel. The CFD concluded that the deviation between diesel fuel pressure and JME not exceeds 3 bar and the trend for compression pressure almost the same, also the temperature deviation between diesel fuel and JME not exceeds 40 K and the trend for temperature almost the same. Finally the maximum heat release rate of JME is lower than that of diesel fuel. The experimental and CFD investigation indicated that the Jatropha biodiesel can be used instead of diesel fuel oil with safe engine operation.

Keywords : dual fuel diesel engine, natural gas, Jatropha Methyl Ester, volumetric efficiency, emissions, CFD

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