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Investigation on the Performance of Biodiesel and Natural Gas-Fuelled Diesel Engines for Shipboard Application

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Abstract : The shipping industry has begun to seriously look at ways of reducing fossil fuel consumption so that current reserves can last longer and operate their ships in a more environmentally friendly way. The concept of Green Shipping or Sustainable Shipping with the use of alternative fuels is now becoming an important issue for ship owners, shipping lines and ship builders globally. This paper provides a critical review of the performance of biodiesel and natural gas-fuelled diesel engines for shipboard application. The emission reduction technique included the use of either neat or emulsified rapeseed methyl ester (RME) for pilot ignition and the emission of NOx, CO2 and SOx were measured at engine speed range of 500 - 1500 r/min. The NOx concentrations were compared with the regulated IMO MARPOL73/78, Annex VI, Tiers I, II, III and United States Environmental Protection Agency (US-EPA) standard. All NOx emissions met Tier I and II levels and the EPA standard for the minimum specification of category 1 engines at higher speed but none met the MARPOL Tier III limit which is for designated Emission Control Areas (ECAs). No trace of soot and SOx emission were observed.

Keywords : dual-fuel, biodiesel, natural gas, NOx, SOx, MARPOL 73/78 Annex VI. USEPA Tier 3, EURO V &VI
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