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Cylinder Pressure Cyclic Variations in a Diesel Engine operating with Biodiesel-Alcohol Blends

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Abstract

Biofuels include biodiesel and alcohols are considered sustainable replacements for fossilized fuels due to their higher oxygenated content with superior combustion characteristics. However, the combustion characteristics for biofuels are not fully understood and require more research works to investigate how the biofuels characterize. Therefore, the aim of this paper is to investigate the cyclic variations of the cylinder pressure in the single cylinder diesel engine operating with biodiesel-alcohol (BBu10 and BE10) blends with palm biodiesel (B100) and mineral diesel (B0) as the baseline fuels. These test fuels are tested at full engine load under a constant engine speed of 2300 rpm. The engine combustion characteristics were examined using cyclic variations of combustion pressure and indicated mean effective pressure (IMEP) at 200 cycles. Statistical analysis of combustion characteristics of diesel engine has been carried out over two different engine load and speed. The results of this study demonstrate that the cyclic variations of combustion characteristics of BE10 are very high. The results also showed that presented that the engine operating with B100 and BBu10 tend to be very stable as compared to mineral diesel using COVIMEP. It can be concluded from the study that alcohols contribute a significant effect on the higher engine cyclic variation that related to engine combustion characteristics.

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Keywords: Cylinder pressure; cyclic variations; diesel engine; biodiesel; alcohol

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