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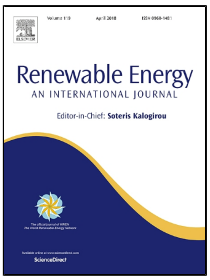

Impact of fusel oil moisture reduction on the fuel properties and combustion characteristics of SI engine fueled with gasoline-fusel oil blends

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Impact of fusel oil moisture reduction on the fuel properties and combustion characteristics of SI engine fueled with gasoline-fusel oil blends

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Abstract

In this study, statistical analysis was used to reveal the significant relation between fuel properties and the reduction of moisture contents at a various fraction of fusel oil in the blend. In addition to this, it is also aimed to conduct a comparative study on the effect of the fuel properties on the combustion characteristics before and after moisture extraction from fusel oil. The moisture content of fusel oil was extracted by employing rotary extractor method, and the fuels were tested in an SI engine under different open throttle valve position (load) and 4500 rpm speed of the engine. As a result, the heating value and carbon content improved significantly after extracting the moisture content from fusel oil by 13% and 7% respectively. According to the statistical analysis of test fuel properties results, the heating value, oxygen, and carbon content have statistically significant effects on the test fuels as the fraction of fusel oil increased especially after moisture extraction. Furthermore, the brake power and BSFC observed to be improved by extracting the moisture content with shorter combustion durations. Almost all fusel oil-gasoline blends have lower COV IMEP at all engine loads compared to pure gasoline.

Keywords: Fusel oil; heating value; Spark ignition engine; Combustion characteristics; Statistical analysis; moisture content.

1. Introduction

Alternative fuels for transport, including ethanol, biodiesel, and many other liquid fuels, have the potential to compensate or replace a number of fossil fuels worldwide over the ensuing few