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Research Paper

Performance and combustion characteristics of an SI engine fueled with fusel oil-gasoline at different water content



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HIGHLIGHTS

- Effects of different water content on engine performance and combustion characteristics.
- The combustion durations decreased by reduced the water content of fusel oil.
- COVIMEP variations are lower with fusel oil gasoline blends.
- The oxygen content decreased by reduction water content of fusel oil by 14%.
- The carbon content increased by reduction moisture content of fusel oil by 7.9%.

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ABSTRACT

The main objective of the current study is to investigate the impacts of fusel oil-gasoline blends with different water content on performance and combustion characteristics of an SI engine. The water content of fusel oil is reduced by employing rotary extractor method. The parameters examined in the current study are the effects of test fuels upon engine performance criteria, fuel combustion, location of CA50 and coefficient of variation of indicated mean effective pressure (COV_{IMEP}). The experiments are conducted in a SI engine with two blending ratio of gasoline-fusel oil (FBWE10 and FAWWE10) in addition to pure gasoline as a standard fuel under different engine speeds and constant 45% of WOT engine load. The study results reveal that engine power, torque, and brake thermal efficiency have slightly improved with fusel oil-gasoline blends that were obvious clearly after reduction of water content. On the other hand, though the brake specific fuel consumption of FAWWE10 slightly improve compared to FBWE10 but still higher than gasoline. Furthermore, the peak in-cylinder pressure, rate of heat release, and rate of pressure rise enhanced with fusel oil-gasoline blends. The (CA 0–10) and (CA 10–90) duration could be simultaneously decreased by reducing the water content of fusel oil, all of that are helpful to improve the stability of combustion and thought to be reasons for the reduction in COV_{IMEP}. As a conclusion, the reduction of fusel oil water content has played positively to enhance the combustion and performance characteristics of the fuel blend and result in more stable engine operation.