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Research Paper

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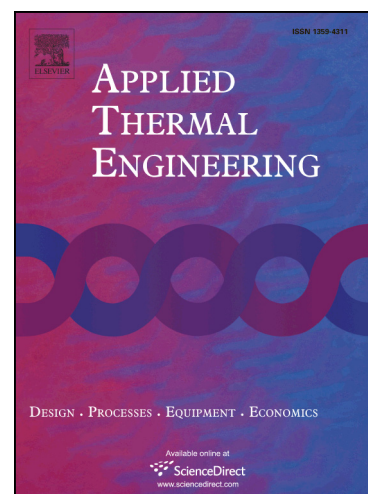
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The effect of compression ratio on the performance and emission characteristics of a dual fuel diesel engine using biomass derived producer gas

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Abstract: The emission level produced from agriculture waste during wheat and paddy harvesting season causes an environmental disturbance in many states of India. In the present work, the performance and emission characteristics are studied by using downdraft gasifier and direct injection variable compression diesel engine. Besides emission characteristics, diesel replacement and noise level at different loads and compression ratios were also estimated. It was observed that maximum diesel saving attained was 8.7%, 31.82%, 57.14% and 64.3% at a compression ratio 12, 14, 16 and 18 respectively. An average reduction of 63.62% in HC emission was achieved by increasing the compression ratio from 12 to 18 at 3.2 kW brake power. With dual fuel mode NO_x emission was reduced (in the range 35.29–56.09% for different conditions) as compared to diesel fuel mode. Further, the SO_x emission levels were up to 45.45% less in the dual fuel mode.

Keywords: Producer gas, Compression ratio, Dual fuel, Emission, Heat release rate, Peak pressure

1. Introduction

The emission level produced from woody/agriculture wastes are very high in states of India like Punjab and Haryana. The annual biomass generated from agriculture waste in Punjab state alone is 24843 thousand metric ton [1]. Further, it is reported that the annual major crops residue in Punjab state is about 41890 thousand metric ton [2]. These wastes are used to

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