ABSTRAK

ANALISA PENGGUNAAN BIODIESEL MINYAK JAGUNG TERHADAP KINERJA MESIN DIESEL DAN EMISI GAS BUANG

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Biodiesel merupakan bahan bakar yang dipakai sebagai alternatif bagi bahan bakar mesin Diesel dan terbuat dari sumber terbaharui seperti minyak nabati antara lain minyak jagung. Ketersediaan bahan bakar minyak yang sangat terbatas dapat diatasi dengan melakukan pencampuran menggunakan biodiesel. Penggunaan energi alternatif biodiesel minyak jagung ini diharapkan nantinya dapat mengatasi ketergantungan penggunaan bahan bakar fosil. Penelitian ini bertujuan untuk mengetahui pengaruh variasi campuran bahan bakar solar dan biodiesel terhadap prestasi mesin dan emisi gas buang mesin Diesel 4 Langkah. Penelitian ini menggunakan variasi bahan bakar solar murni, B5, B10 dan B15 pada putaran mesin 1.000 rpm, 2.000 rpm dan 3.000 rpm dengan variasi bukaan katup beban laju aliran beban dinamometer 0,5; 1; dan 1,5 putaran. Penelitian ini dilakukan di Laboratorium Motor Bakar dan Propulsi Teknik Mesin, Universitas Lampung dengan manggunakan alat uji prestasi mesin yaitu mesin Diesel HATZ empat Langkah TD202 dan alat uji emisi gas buang yaitu mesin *Stargas* 898. Berdasarkan data dari hasil pengujian, diperoleh campuran terbaik pada penggunaan bahan bakar B15 dengan peningkatkan nilai torsi sebesar 66,15%, daya engkol sebesar 55,10% dibandingkan dengan bahan bakar solar murni. Sedangkan untuk penurunan konsumsi bahan bakar spesifik engkol (bsfc) yang paling hemat diperoleh pada campuran bahan bakar B5 sebesar 83,33% dibandingkan bahan bakar solar murni. Penurunan *opacity* emisi gas buang pada variasi campuran bahan bakar B15 bukaan katup 0,5 putaran yaitu diperoleh sebesar 49,3% dibandingkan dengan *opacity* emisi gas buang pada solar. Sedangkan penurunan *opacity* emisi gas buang pada bukaan katup 1,5 putaran yaitu diperoleh sebesar 4,16% dibandingkan dengan *opacity* emisi gas buang pada bahan bakar solar.

Kata kunci: solar-biodiesel, biodiesel minyak jagung, prestasi mesin, emisi gas buang.

ABSTRACT

ANALYSIS OF CORN OIL BIODIESEL USE ON DIESEL ENGINE PERFORMANCE AND EXHAUST EMISSIONS

By

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Biodiesel is a fuel used as an alternative to diesel engine fuel and is made from renewable sources such as vegetable oils, including corn oil. The very limited availability of fuel oil can be overcome by blending it using biodiesel. It is hoped that the use of alternative energy such as corn oil biodiesel will be able to overcome dependence on the use of fossil fuels. This research aims to determine the effect of variations in diesel and biodiesel fuel mixtures on engine performance and exhaust emissions of 4 stroke diesel engines. This research uses variations of pure diesel fuel, B5, B10 and B15 at engine speeds of 1,000 rpm, 2,000 rpm and 3,000 rpm with variations in valve openings, dynamometer load flow rate of 0.5; 1; and 1.5 turns. This research was carried out at the Internal Combustion Engine and Propulsion Laboratory, Mechanical Engineering Department, University of Lampung using engine performance test equipment, namely the TD202 four-stroke HATZ Diesel engine and exhaust gas emission test equipment, namely the Stargas 898 engine. Based on data from the test results, the best mixture of fuel was obtained. B15 with an increase in torque value of 66.15%, cranking power of 55.10% compared to pure diesel fuel. Meanwhile, the most economical reduction in brake specific fuel consumption (bsfc) was 83.33%, obtained with the B5 fuel mixture compared to pure diesel fuel. The reduction in exhaust gas emission opacity in variations of the B15 fuel mixture with a valve opening of 0.5 revolutions was 49.3% compared to the exhaust gas emission opacity in diesel. Meanwhile, the reduction in exhaust gas emission opacity at a valve opening of 1.5 revolutions was obtained by 4.16% compared to the exhaust gas emission opacity in diesel fuel.

Keywords: *Diesel-biodiesel, corn oil biodiesel, engine performance, exhaust emissions.*