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Influence of magnetized waste cooking oil biodiesel on performance and exhaust emissions of a diesel engine

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Abstract : Continuous fuel consumption increase and harmful exhaust emissions led to intensive search about alternative fuels and techniques for fuel saving. Waste cooking oil (WCO) biodiesel was derived from WCO by transesterification process. Biodiesel properties were within acceptable limits of ASTM standards. Biodiesel blends were prepared from diesel and WCO biodiesel in volume percentages of 10 and 20% as B10 and B20. A comparative study of performance and exhaust emissions of a diesel engine burning biodiesel blends under magnetic field effect. The magnetic field was mounted along the fuel line before fuel injector. The magnetic field was produced from a permanent magnet of 4000 Gauss. Influence of magnetic field on performance parameters such as specific fuel consumption, thermal efficiency, exhaust gas temperature and air- fuel ratio of a diesel engine was studied at different engine loads. Exhaust emissions such as CO, CO₂, HC and NO_x for a diesel engine burning biodiesel blends B10 and B20 under the effect of magnetic field were studied. Applying the magnetic field to fuel line increased thermal efficiencies for crude diesel, waste cooking oil biodiesel blends B10 and B20 by 2, 4 and 11 %, respectively. There were decreases in CO emissions by 3, 3.5 and 4 for diesel oil and biodiesel blends B10 and B20, respectively under magnetic field. Decreases in HC emissions for diesel, B10 and B20 fuels were 6, 11 and 8%, respectively. Decreases in NO_x emissions by 3, 1.5 and 2% for diesel and biodiesel blends B10 and B20, respectively were shown with the effect of fuel magnet.

Keywords : WC, Biodiesel, Magnetic field, Performance, Emissions.

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