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Diesel engine operating with hydrogen in bi-fuel mode: fuel consumption and emissions

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Abstract

This work analyzes a diesel engine behavior when fuelled with diesel oil and hydrogen. Analytical and experimental analyses were performed. The experiments were carried out in a diesel power generator. An electronic system was developed to control the injection of hydrogen in the intake manifold, with partial replacement of diesel oil. The engine was fuelled in bi-fuel mode with hydrogen concentrations of 5%, 10%, 15% and 20%. Temperature and pressure were measured at various points of the system. Intake air mass flow rate, diesel oil, hydrogen mass flow rates, and the electric power generated were measured. The results showed that the partial replacement of diesel oil by hydrogen leads to increased thermal efficiency and reduced diesel oil consumption and the carbon dioxide (CO_2) emission. The analytical model was appropriate to quantify the hydrogen and diesel oil mass flow rates into the engine operating in bi-fuel mode.