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EFFECT OF ETHANOL-GASOLINE MIXTURES ON PERFORMANCE AND EMISSIONS OF LIGHT PASSENGER CAR ON DIFFERENT DRIVING CYCLES

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Abstract

In this study, the selected light-weight vehicle model was run in ECE, New European Driving Cycle (NEDC) and Worldwide Harmonized Light Vehicles Test Cycles (WLTC) in addition to the use of ethanol-gasoline blended fuel to reduce the harmful effects of pollutants from gasoline combustion. The 4-cylinder engine model of the vehicle was first applied with AVL Boost software. In addition, in order to verify this theoretical model, a real experimental system was set up and in-cylinder pressure and fuel consumption data were obtained. Then, the energy consumption, CO, HC and NO_x data for E15, E30 and E50 fuels were mapped with the SI engine model that was confirmed. Afterwards, a model of the selected vehicle was created with the help of Matlab Simulink. Subsequently, ethanol-gasoline blends in ECE, NEDC and WLTC driving cycles were compared in terms of fuel consumption and emissions. An improvement in energy consumption, CO and HC emissions for all ECE, NEDC and WLTC driving cycles with increased ethanol content was obtained as a result. However, NO_x emissions increased with each driving cycle as the ethanol content also increased. In addition, NO_x emissions were 70% and 35% less in total in the ECE driving cycle than in the other two driving cycles.

Key words: driving cycle, engine map, ethanol-gasoline blends, Simulink, vehicle model

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