

Analysis and simulation of combustion and emission on small engine

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ABSTRACT

Liquefied Petroleum Gas (LPG) has become an interesting topic in the automotive industry to develop the engines with clean emission characteristics. The usage of gasoline as a fuel to power up the vehicle will contribute to the heavy environmental problem. A single cylinder four-stroke spark ignition (SI) engine that fueled by LPG and gasoline are used to predict and analyze the combustion process in the cylinder. A zero dimensional models are most suitable analytical models for engine cycle simulation. The simulation program has been developed using MATLAB software by implementing a single-zone thermodynamic model. The first law of thermodynamics is applying into this model and Annand's model was used to compute the convection and radiation of heat transfer within the cylinder. The engine performance parameters computed including the in-cylinder pressure, gas temperature, net heat release, mass fraction burn, brake power, torque, indicated specific fuel consumption. Then, exhaust emission in the cylinder was predicted by the formation of emission model. The results of engine performance are compared between gasoline and LPG as a fuel. Results show LPG engine has contributed to the lower HC and NO_x emissions compared to gasoline. It proved that the development of simulation program is useful to calculate the engine performance at different operating points.

KEYWORDS:

Automotive industry; Diesel engines; Engine cylinders; Gasoline; Heat transfer