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ABSTRACT

The objective of this study is to investigate the engine injection characteristics and deposit formation for biofuel. Utilizing waste cooking oil and non-edible castor oil to make biodiesel could replace the food-derived fuels and reduce ecologic pollution. Due to the high viscosity and water content, straight crude oil cannot be used as a fuel for DI engine. In this study, transesterification and emulsion technologies have been utilized to improve the injection spray characteristics for biofuels. A biodiesel producing machine was built up to analyze the producing process of biodiesel from waste cooking oil and non-edible oil. To study the biodiesel spray characteristics, a constant-volume bomb was established to analyze the injection spray characteristics under elevated temperature. Meanwhile, after long-term engine test, the biodiesel leads to the problem of engine deposition. Thus, a biofuel deposit simulator was developed to solve the deposit problem. The experimental results indicated that diesel generator operated on biofuel could improve the fossil diesel emissions. The higher NOX emission of biofuel was solved by water-biodiesel emulsion technology. The biofuel deposit simulator can provide some potential deposit control additives for biodiesel during the laboratory research stage. Without changing the engine structure, when the injection pressure was increased by 5-10%, the optimum combination suggested was 15-20% of water, 2-5% of bioethanol, 0.2-0.5% of composite surfactant Span-Tween and 2000ppm deposit-control additive. The biodiesel injection spray characteristics was improved, and the NOX and deposition problem could be solved.

Keywords : 生質柴油、噴霧特性、引擎積污、NOx 排放

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