

Effect of Fuel Injection Discharge Curve and Injection Pressure on Upgrading Power and Combustion Parameters in HD Diesel Engine with CFD Simulation

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Abstract : In this study, the effect of fuel injection discharge curve and injection pressure simultaneously for upgrading power of heavy duty diesel engine by simulation of combustion process in AVL-Fire software are discussed. Hence, the fuel injection discharge curve was changed from semi-triangular to rectangular which is usual in common rail fuel injection system. Injection pressure with respect to amount of injected fuel and nozzle hole diameter are changed. Injection pressure is calculated by an experimental equation which is for heavy duty diesel engines with common rail fuel injection system. Upgrading power for 1000 and 2000 bar injection pressure are discussed. For 1000 bar injection pressure with 188 mg injected fuel and 3 mm nozzle hole diameter in compare with first state which is semi-triangular discharge curve with 139 mg injected fuel and 3 mm nozzle hole diameter, upgrading power is about 19% whereas the special change has not been observed in cylinder pressure. On the other hand, both the NOX emission and the Soot emission decreased about 30% and 6% respectively. Compared with first state, for 2000 bar injection pressure that injected fuel and nozzle diameter are 196 mg and 2.6 mm respectively, upgrading power is about 22% whereas cylinder pressure has been fixed and NOX emission and the Soot emissions are decreased 36% and 20%, respectively.

Keywords : CFD simulation, HD diesel engine, upgrading power, injection pressure, fuel injection discharge curve, combustion process

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