
Fuel feed system with injection pressure control for diesel engines

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The paper presents a new fuel injection system for a diesel engine. This system allows to control the pilot and post injection pressures and to change pressure history for a main injection. This fuel injection system consists of a unit injector with the independent control of the injection pressure and the needle lift. Due to the shape of the unit injector cam drive the plunger velocity is constant. Therefore pressure in the high-pressure chamber can be constant. The value of this pressure is set by a piezoelectric pressure control valve. The high-pressure chamber and the fuel supply line are connected by the pressure control valve. The pressure control valve orifice depends on piezostack voltage. So, when the value of the voltage changes, pressure in the high-pressure chamber changes too. The needle lift is controlled by the solenoid-, piezo- or mechanical actuated open and shut needle control valve. A mathematical model of this fuel injection system has been created. Calculation has been carried out for a multiple injection, which consists of one pilot, one main and one post injection. Calculations were carried out for four types of main injection pressure history: boost, trapezoidal, ramp and rectangle. It is shown, that proposed fuel injection system allows to realize all four main injection pressure histories and to control the pilot and post injection pressures. This fuel injection system is promising, but it needs further research.

Keywords: diesel engine, fuel injection system, unit injector, rate shape of main injection, piezoelectric pressure control valve.

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