



Investigation of Main Injection Quantity Fluctuation due to Pilot Injection in High Pressure Common Rail Fuel Injection System

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Abstract- High pressure common rail (HPCR) fuel injection system is the main development trend for fuel injection system of diesel engine. Precise controlling of injection pressure and multiple injections are the advantages and key features of the HPCR system. Affect of pilot injection quantity (PIQ) and pilot-main interval (PMI) on main injection quantity fluctuation (MIQF) has been investigated in this paper by evaluating performance coherence and stability of injection quantity of diesel engine. A numerical model of HPCR system has been development in AMESim environment. Predicting accuracy of the numerical model has been validated by comparing its results with experimental data. The results show that the pilot injection triggers pressure cyclical fluctuation in the electro-injection delivery chamber and gives rise to MIQF. Amplitude of MIQF decreases with increase of PMI and increase with increase of PIQ. Moreover, variation of PIQ has also influence on both the amplitude and the phase of MIQF. Influence of MIQ on amplitude of MIQF depends on how many pressure fluctuation cycles have been incorporated in the main injection.

Index terms: High pressure common rail, Numerical model, Pilot-main injection, Main injection quantity, Pilot-main interval.