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Experimental Investigation of Compressed Natural Gas Injector for Direct Injection System

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Abstract : This paper presents the bench research results on a CNG injector at steady state. The quantities measured included voltage and current in a solenoid, pressure of gas behind an injector and injector's flow rate. Accordingly, injector's operation parameters were determined according to needle's lift and injection pressure. The discrepancies between the theoretical (electric) and actual time of injection were defined to specify injector's opening and closing lag times and the uniqueness of these values in successive cycles of gas injection. It has been demonstrated that needle's lift has got a stronger impact on injector's operating parameters than injection pressure. With increasing injection pressure, the force increases and closes an injection valve, which adversely affects uniqueness of injector's operation. The paper also describes the concept of an injector dedicated to direct CNG injection into a combustion chamber in a dual-fuel engine. The injector's design enables us to replace 80% of diesel fuel in a dual-fuel engine with a maximum power of 85 kW. Minimum injection pressure is 1,4 MPa then. Simultaneously, injector's characteristics for varied needle's lifts and injector's nonlinear operating points were developed. Acknowledgement: This work has been financed by the Polish National Centre for Research and Development, under Grant Agreement No. PBS1/A6/4/2012.

Keywords : CNG injector, diesel engine, direct injection, dual fuel
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