V. Pajković
University of Montenegro, Faculty of Mechanical Engineering, Podgorica
S. Petrović
University of Belgrade, Faculty of Mechanical Engineering, Belgrade

EXPERIMENTAL INVESTIGATION OF SPATIAL FLOW VELOCITY DISTRIBUTIONS IN THE INTAKE VALVE GAP OF AN I.C. ENGINE

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Abstract
An experimental investigation of the airflow through tangential intake port of a standard production direct injection (DI) diesel engine is presented. The investigation comprises mass flow rate and pressure drop measurements at fixed valve lifts, and spatial distributions of mean and r.m.s. velocity components around the valve gap measured under steady flow conditions by special designed miniature hot-wire anemometer X probe. The results show that the velocity field is distributed non-uniformly across the valve gap and around valve periphery. Nonuniformity is more expressed at higher valve lifts. Flow instability in a jet leaving the port (jet flapping) is also evident since the skewness and kurtosis of the velocity probability distribution function depart from the Gaussian form. The presented experimental method, based on the application of miniature multiple hot-wire probes, makes possible investigation of flow performances of an intake port and poppet valve assembly of a production engine head without any modification for ensuring an optical access within the cylinder and/or the port.
Key words: engine flow, intake port/valve assembly, hot-wire anemometry, spatial flow velocity distribution