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Stereo PIV를 이용한 SI 기관의 3차원 텀블 유동 측정2-텀블 유동 평가

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3D Tumble Flow Measurement of SI Engine Using Stereo PIV2-Tumble Flow Evaluation

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Key words : Stereo PIV(스테레오 레이저 입자영상 유속계), Tumble(텀블), Angular Displacement (각도 변위), Internal Combustion Engine(내연기관)

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The tumble flow of the reciprocating engine was evaluated through the steady-flow bench and PIV and compared. PIV was conducted in parallel with 3D and 2D, and the results of these two evaluations were also compared. As a result of 2D measurement, it was confirmed that a high-speed flow of 50 m/sec or more existed on the wall opposite to the intake port, and a reverse flow along the wall was observed in a plane perpendicular to the suction direction. Looking at the 3D measurement result, it is macroscopically consistent with the 2D result, but there is a difference in the detailed distribution. Specifically, the axial velocity measured in 3D is generally lower than that in 2D, which is determined to be due to the passage of particles in a shorter time than the laser pulse interval when the flow speed is high, and thus not measured. In particular, in the case of 3D, the area where flow measurement is impossible near the wall is larger than that of 2D. Due to these various factors, there are differences depending on the method in calculating the flow rate and tumble value. However, despite these limitations, 3D PIV measurements provide sufficient qualitative information on flow characteristics and distribution.

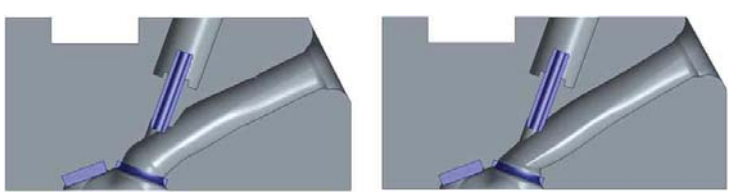

Fig. 1 Two port for evaluation

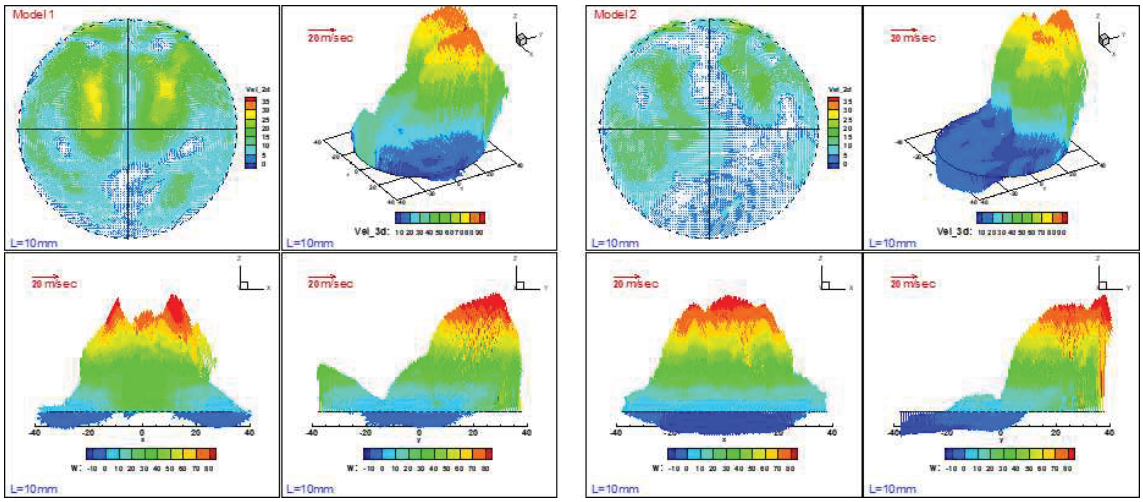

Fig. 2 Velocity distribution of two ports

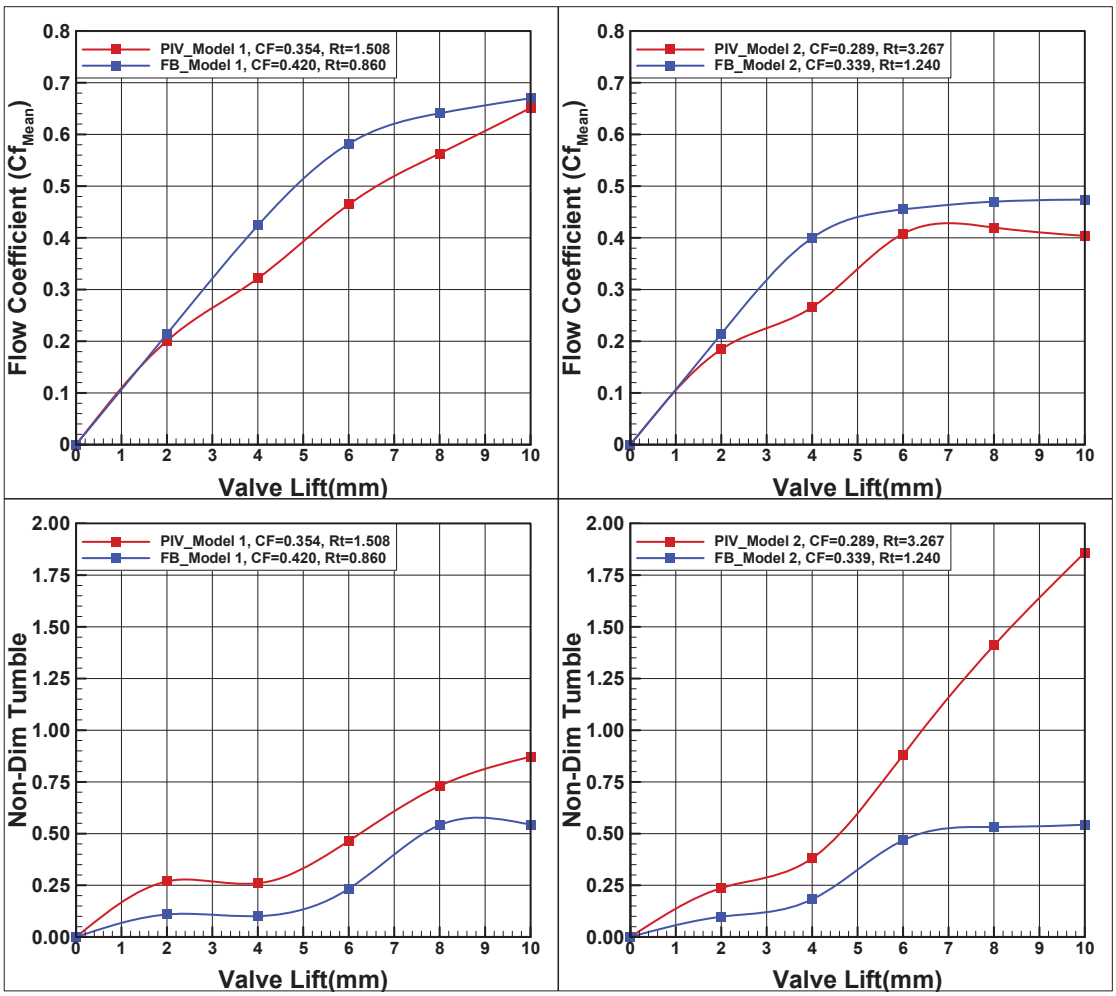

Fig. 3 Flow coefficient and dimensionless tumble