

Abstract Submitted  
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**The 80 eyes PIV** AKIYOSHI MAEKAWA, JUN SAKAKIBARA, Meiji University — In order to reduce measurement error and expand the dynamic range of PIV, we developed a ellipsoidal polyhedral mirror placed between camera and flow target to capture images of identical particles from  $n$  (=80 in maximum) different directions. The 3D particle positions were determined from the ensemble average of  ${}_nC_2$  intersecting points of a pair of line of sight back-projected from a particle found in two images extracted from  $n$  images. We hypothesized that the error of measured particle displacement is reduced by a factor of  $1/\sqrt{n}$  thanks to the central limit theorem. A rigid-body rotating flow and a turbulent pipe flow were measured by the above method. In the former measurement, bias error and random error fell into a range of 0.02 pixels and 0.025 to 0.05 pixels, respectively, and the random error decreases in proportion to  $1/\sqrt{n}$ . In the latter measurement in which the measured value was compared to DNS, the bias error was reduced, and the random error also decreases in proportion to  $1/\sqrt{n}$  when the particle displacement was relatively small. When the particle displacement was larger, the random error was difficult to estimate, since a discrepancy of the experiment and DNS results might be dominant.

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