

## 골프공에서의 딴플의 역할

최진<sup>†</sup> · 전우평\* · 최해천\*(서울대)

## Role of Dimples on Golf Ball

Jin Choi, Woo-Pyung Jeon and Haecheon Choi

**Key Words:** Golf ball(골프공), Dimples(딴플), Separation(유동박리), Drag(항력)

**Abstract :** It is an open question why the drag coefficient on golf ball remains nearly constant with increasing Reynolds number after its sharp decrease. In order to investigate this interesting phenomenon, we measure the drag, separation angle, wall pressure and streamwise velocity inside/outside dimples before main separation. When drag reduction occurs, the separation angle measured is nearly constant and the wall pressure distributions outside dimples are nearly the same even with increasing Reynolds number. From the streamwise velocity measurement, it is found that dimples located at the angles of  $65^{\circ}\sim 90^{\circ}$  make an important role in changing flow characteristics. Inside one or two rows of dimples located at those angles, a small separation bubble exists and flow becomes quickly transitional and turbulent with reattachment. The main separation occurs further downstream at  $110^{\circ}$  irrespective of the Reynolds number, because downstream dimples do not make an important role in changing flow characteristics any more.

## 단일 와 생성 탭이 부착된 제트 유동의 SPIV 유동장 해석

장영길<sup>†</sup> · 이상준\*(포항공대)

## SPIV Analysis of Round Jet having a Single Vortex Generating Tab

Y.G. Jang<sup>†</sup>(POSTECH) and S.J. Lee\*(POSTECH)**Key Words:** Round jet(원형 제트), Stereo PIV(스테레오스코픽 PIV), Tab(탭), Mixing enhancement(혼합향상).

**Abstract :** Flow structure of a turbulent jet having a vortex generating tab placed at the nozzle exit was investigated experimentally. In this study, the jet flow with a vortex generating tab was measured using stereo PIV(SPIV) method. SPIV measurements were carried out at several cross-sectional planes and longitudinal planes. Five hundred instantaneous velocity fields were measured at each plane and they were ensemble averaged to get spatial distributions of turbulent statistics. Entrainment rates of surrounding fluid into the jet shear layer were also calculated from the measured velocity field in order to estimate the mixing enhancement due to presence of a tab. The results were compared with those without a tab. The jet with a tab was found to generate large-scale streamwise vortices effectively. The strong streamwise vortices seem to enhance turbulent mixing with ambient fluid. In addition, the effect of tab on heat transfer enhancement was investigated experimentally with varying the nozzle-to-plate distance.