Journal of Visualization, Vol. 4, No. 1 (2001) 3

1. Visualization of the In-flight Particle Velocity in the Mixed Plasma Jet under the Applied Magnetic Field

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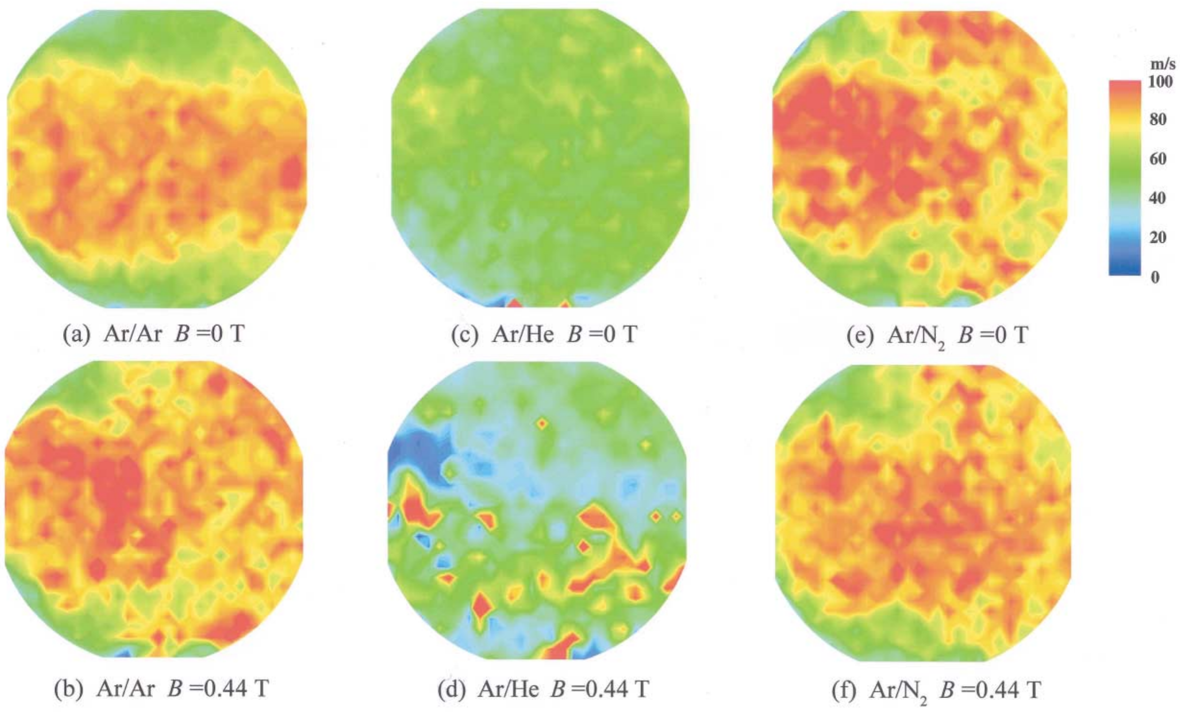

Keywords: Magnetic field, Gas mixing, Plasma jet, Particle, PIV

The mixed plasma is produced at DC discharge power of 11kW, and operating pressure of 700Pa. The primary argon gas is supplied at 30 *l*/min and further argon, helium or nitrogen gas is introduced vertically at 50 *l*/min as a secondary gas. The 10μm alumina particles are also injected vertically at 6g/min. The applied magnetic field is 0.44T. When the magnetic field is applied, in-flight particle velocity is accelerated by the reaction of radial Lorentz force acted on the Ar and Ar/He plasma jet, which is not the case for Ar/N2 plasma jet. The particle velocity in the Ar/He plasma jet decreases considerably due to the small momentum exchange between plasma and particles.

Journal of Visualization, Vol. 4, No. 1 (2001) 4

2. Instability of an Annular Sheet Liquid Flow, Bubble Regime

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This picture shows the annular liquid sheet produced by a snow generator. This annular sheet is destabilised by a coflowing internal air stream. Different regime of break up may be observed. The longitudinal scales show an encapsulation process. This process was studied extensively and recently modelled at CORIA (X. Jeandel, M. Ledoux. Instability of an Annular Liquid Sheet. The Encapsulation Process. ILASS-EUROPE 2000 Darmstadt 11-13 September 2000)

Journal of Visualization, Vol. 4, No. 1 (2001) 5

3. Pressure Atomiser : Hole Breakup of the Sheet

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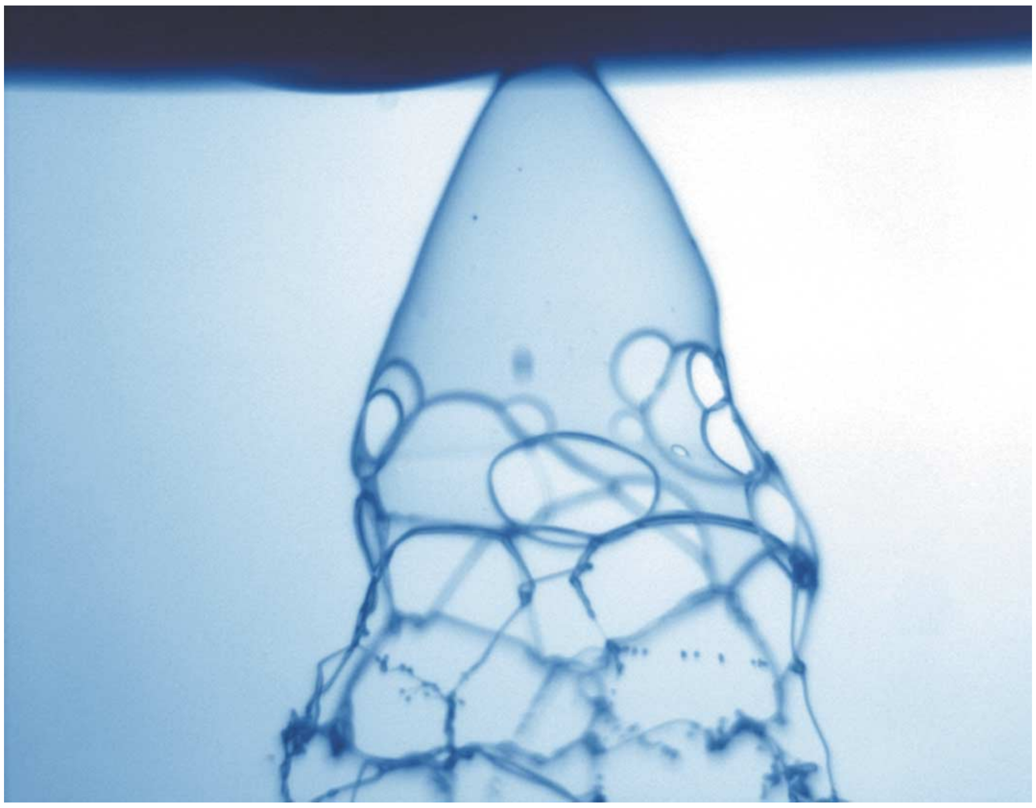

The picture shows the sheet produced by a pressure swirl atomiser at initial stage of break up. The liquid pulverised is a mixture of water and a polymer charge. The liquid is slightly non-Newtonian, and opposite to what occurs with low viscosity liquids, the break up is occurring through the appearance of holes.

Journal of Visualization, Vol. 4, No. 1 (2001) 6

4. Jewels in the Sea

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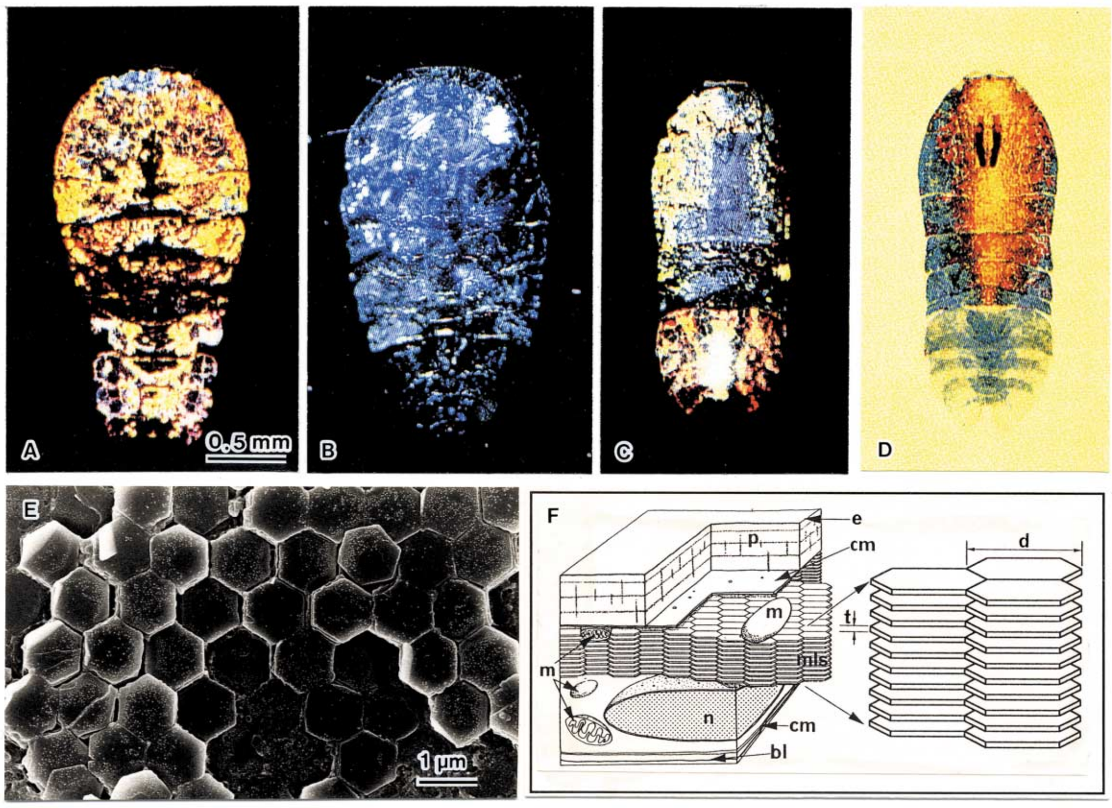

Known as among the most remarkable creatures in the open sea, males of the planktonic copepods (a group of small crustaceans of millimeter size) of the genera *Sapphirina* (A, C and D) and *Copilia* (B) show beautiful iridescence. They often appear in sunlit, near-surface layers and give the water an iridescent appearance. This iridescent water is called "tama-mizu" (meaning jewelly-water) by old Japanese fishermen as an indicator of the Kuroshio Current, a fishing ground of skipjack tuna. Their iridescent colors in the sea can be visualized in the laboratory by illuminating the animals with a white light which is reflected by their integument (A-C). The iridescent colors are different among species and are correlated with their distributional depths in the daytime; yellowish gold in shallow-living (< ca. 30 m) species (A) and bluer in deeper ones (B and C). Transmitted colors (D, the same animal as in C) are complementary to reflected ones (C), indicating that the iridescent color is a result of interference by multilayered platelets of guanine crystals as visualized by scanning electron microscopy (E). The crystal thickness (*t* in F, a scheme of integument) varies from ca. 60 to 80 nm according to species, corresponding to the species' colors and distributional depths, so that the highest contrast of the animal relative to the background light field is obtained when viewed both from above and below the animal. While the males are iridescent as such, females are non-iridescent but have more developed eyes than the males. The search for and the recognition of conspecific males by females has been proposed as a major role of this iridescence.

Chae, J. and Nishida, S.; "Integumental ultrastructure and color patterns in the iridescent copepods of the family Sapphirinidae (Copepoda: Poecilostomatoida)". Mar. Biol., vol. 119, pp. 205-210 (1994).

Chae, J. and Nishida, S.; "Vertical distribution and diel migration in the iridescent copepods of the family Sapphirinidae: a unique example of reverse migration?". Mar. Ecol. Prog. Ser., vol. 119, pp. 111-124 (1995).

Chae, J. and Kita-Tsukamoto, K., Nishida, S. and Ohwada, K.; "Chemical composition of the integumental reflecting platelets in the iridescent copepods of the family Sapphirinidae (Poecilostomatoida)". J. Crustacean Biol, vol. 16, pp. 20-23 (1996).

Chae, J. and Nishida, S.; "Spectral patterns of the iridescence in the males of Sapphirina (Copepoda: Poecilostomatoida)". J. Mar. Biol. Ass. U. K., vol. 79, pp. 437-443 (1999).

Journal of Visualization, Vol. 4, No. 1 (2001) 7

5. Visualization of Separation Points and Wake at Smooth Ball and Dimpled Balls

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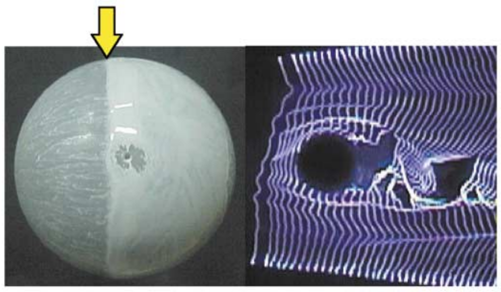
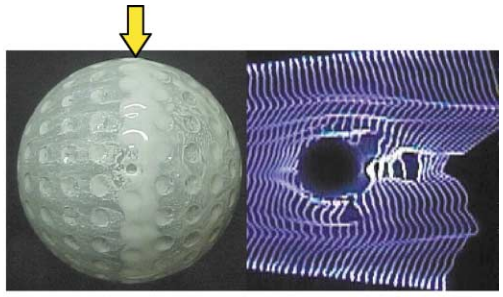
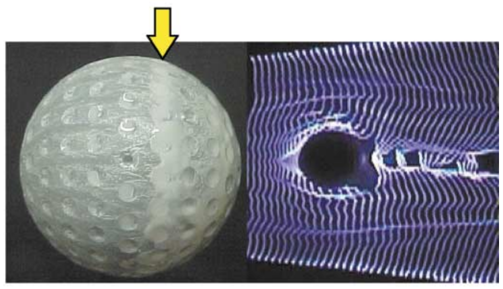


(a) Smooth ball, (Sub-critical Region)



(c) Dimpled ball, (Critical Region)

(b) Dimpled ball, (Sub-critical Region)



(d) Dimpled ball, (Super-critical Region)

Fig.1 Visualization around sphere (Oil Film Method, Spark Tracing Method)

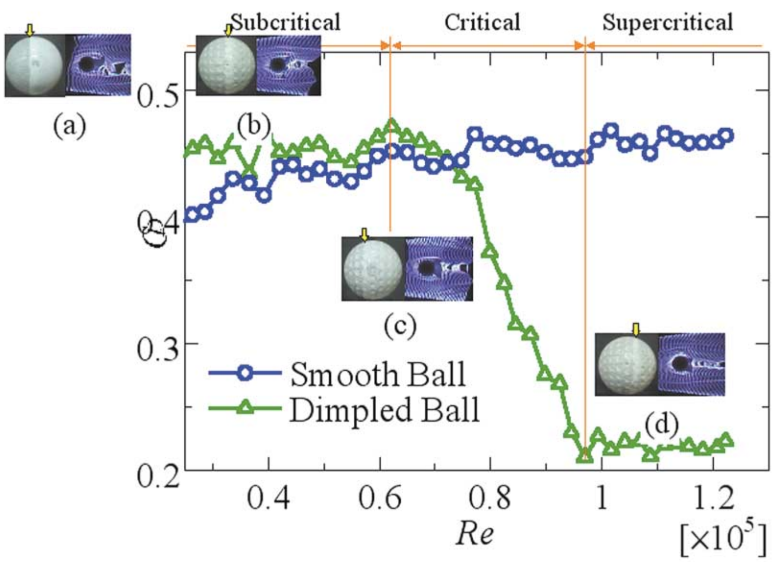


Fig.2 Changes of drag coefficient to the Reynoldes number

Fig.1 (a) shows the flow visualization around a smooth ball using the oil-film method and the spark tracing method. Fig.1 (b)-(d) show the same flow aroud a dimpled ball using the same visualization methods.

Fig. 2 shows the relation between CD and Re about a smooth ball and a dimpled ball together with the visualizaton results at each point. The flow critical point of the dimpled ball located at Re=1.0*105, but the same point of the smooth ball locates at Re=3.5*105. The flow separation point of dimpled ball moves to the down stream direction and the area of wake of it decreases compared with the flow around the smooth ball.

Journal of Visualization, Vol. 4, No. 1 (2001) 8

6. Flow Visualization of Local Wind over Complex Terrain

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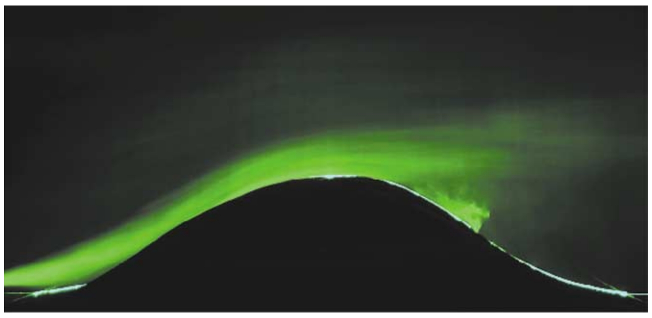
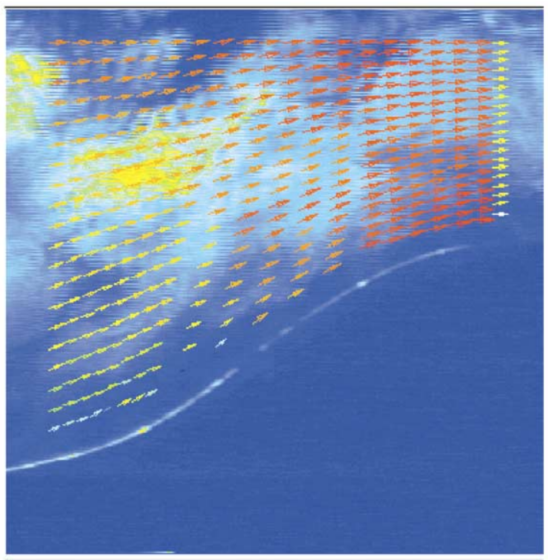


Example of flow visualization around the topographical model



Variation of flow velocity around the topographical model estimated by PIV

Aiming to establish the advanced estimation method for a wind load of transmission towers, the fluid characteristics of atmospheric flows over the complex topography of terrain were experimentally investigated. Flow visualization experiments around the topographical models were conducted with a large-scale vertical water tunnel. Then, the velocity vectors were estimated by PIV (Particle Image Velocimetry) to comprehend the fluctuation characteristics of the velocity field in the boundary layer.