ISFV15-127-S8

15th International Symposium on Flow Visualization
June 25-28, 2012, Minsk, Belarus

COLORED SCHLIEREN VISUALIZATION TECHNIQUE WITH LED LIGHT SOURCE COUPLED BY OPTIC FIBRE

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Abstract: With the development of LED light sources, the light sources are enough brightness to apply in the schlieren visualization; at the same time, the developments of optic fibre make it possible that the LED light can be coupled by the optic fibre and used in the schlieren. In order to overcome the difficult of the area of colored light sources used in the conventional schlieren is large and the lights sources can't be put in a plane as demand, this paper gives a colored schlieren method which uses the many colored LED light sources coupled by the optic fibre, the sensitivity and the definition of the schlieren can be improved by the method.

The luminescence area of the LED light sources coupled by the optic fibre is small; the space of each other can change optionally as need. According to the schlieren imaging theory, the light sources image can be located in a plane when the light input end , namely optic fibre coupling output end is located in a sphere or non-sphere form Similar to the mirror used to collimate the light, so the knife used in the schlieren can cut the light sources image precisely and the schlieren sensitivity can be improved. Also, the definition of the whole flow testing filed can also be improved as the luminance area is smaller and the dispersion aberration is smaller.

Fig. 1 is a sketch map of colored light sources including red, green, blue, yellow and white LED coupled by optic fibre. The diameter of each bunch of light source through the optic fibre coupling is only close to 1mm, and the power of each bunch light at the output end has reached 1W. Fig. 2 is the colored schlieren picture of the lighter flame gotten by the theory devices, the structure of the flow field is clear and the sensitivity of the device is higher.

Key words: Schlieren visualization, LED light source, Optic fibre, Flow filed

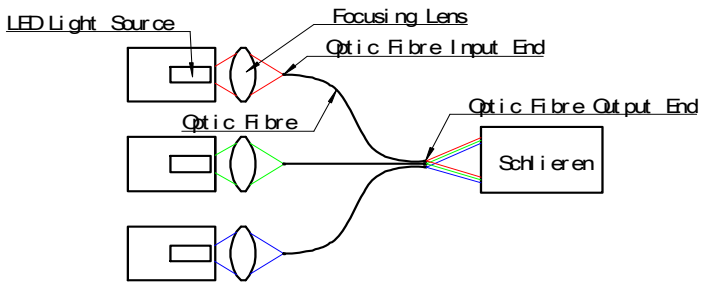

Fig. 1 LED colored light source sketch map coupled by optic fibre

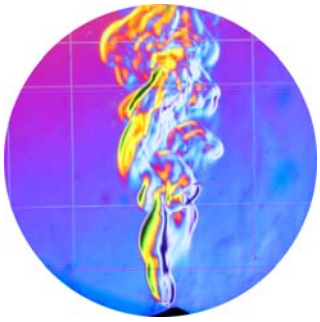

Fig. 2 Colored schlieren picture