

Visualization of High Speed Air Flow by the Spark Tracing Method with Radiant Trail

*Ninomiya, N.*¹⁾, *Akiyama, M.*²⁾, *Sugiyama, H.*¹⁾ and *Katakami, A.*³⁾

1) Department of Energy and Environmental Science, Graduate School of Engineering, Utsunomiya University, 7-1-2 Yoto, Utsunomiya, Tochigi 321-8585, Japan.

2) Professor Emeritus, Utsunomiya University, 7-1-2 Yoto, Utsunomiya, Tochigi 321-8585, Japan.

3) Fuji Heavy Industries Ltd., 1-1, Subaru-cho, Ohta-shi, Gunma 373-8555, Japan.

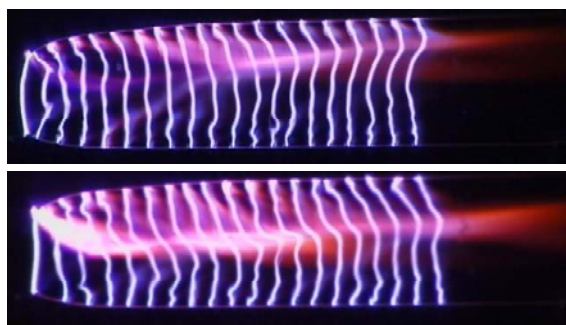


Fig. 1. Sparks with egg shell powder

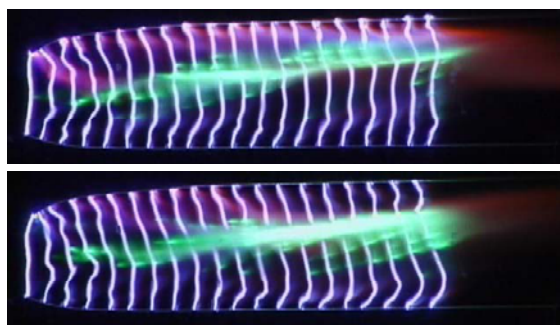


Fig. 2. Sparks with Copper powder.

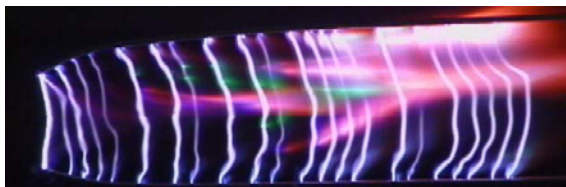


Fig. 3. Sparks with egg shell powder and Copper powder.



Fig. 4. Sparks with Aluminum oxide.

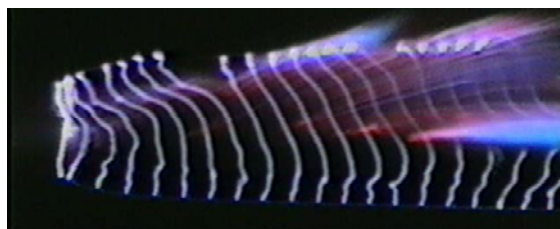
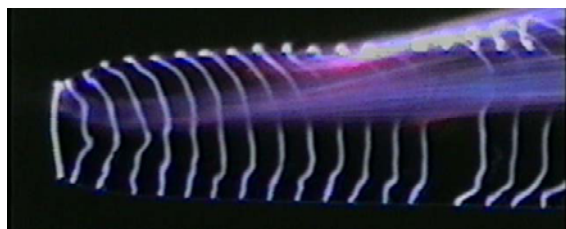


Fig. 5. DP matching results compared with radiant trail.

The spark tracing method is known as a convenient visualization technique for high speed air flow and the time lines can be obtained. Nevertheless, the transverse motion to the time lines is still under question. Presently, the metallic powder is introduced to the incoming air flow and thus the streak lines are also visualized as the radiant trail, which emerges when the powder is burned by the sparks. Calcium in the egg shell presents the red tail as in Fig. 1 and Copper looks green as in Fig. 2. The combination of these powders shows a colorful pattern (Fig. 3). The radiant trail by the fine powder of Aluminum oxide (Fig. 4) represents the detailed flow vectors, which compares very well with the Dynamic Programming matching results (Fig. 5).