

World Center of Education and Research for Trans-disciplinary Flow Dynamics International Internship Program

Chae-hyoung, Kim
School of Mechanical and Aerospace Engineering
Seoul National University
Seoul, Korea

Research title: Stereoscopic-PIV(Particle Image Velocimetry) measurement and combustion characteristics by the upstream pre-heating with a plasma-jet torch

Supervisor: Prof. Goro Masuya

Duration: June 1st 2010 - August 29th 2010

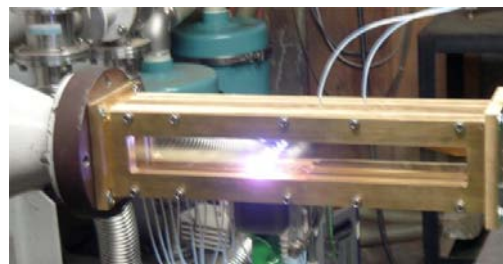
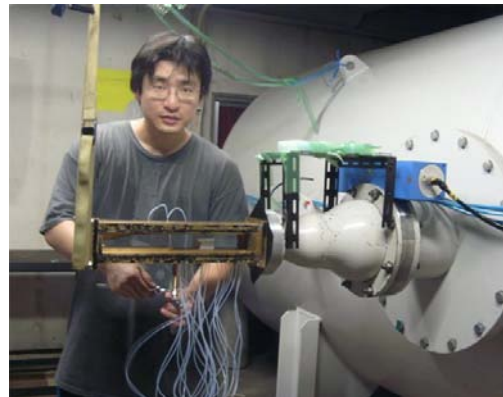
1. TU-SNU Workshop



There was a workshop between Tohoku University (TU) and Seoul National University (SNU) in Katahira Campus of Tohoku University on June. At this workshop, students both SNU and TU showed their researches. I also presented about my previous researches at the workshop. My friend of mine took a picture for me during my presentation time (left picture).

2. Experiment

This summer was suffocating heat. In hot summer, I conducted my experiments in the Masuya-Takita laboratory. In the laboratory, I attached my laboratory-scale supersonic wind-tunnel to a vacuum tank (right picture), and then I arranged experimental tools and measured some experimental results. Although there were some problems due to the hot weather, I could achieve good results thanks to students' assistance of the Masuya-Takita laboratory. Among my research results, a supersonic combustion by a plasma jet torch is displayed in the right down picture. A hydrogen gas is injected downstream of a mixer models. The hydrogen gas and the main air are mixed and ignited by the plasma jet torch. Actually, the combustion of the hydrogen gas cannot be seen due to its ultraviolet rays. The brightness is from the plasma jet which is very high temperature gas including ions and radicals to assist combustion.



3. Friendship



One Saturday, we planned to go to the Yamatera which is a temple on a mountain. We sweated and climbed the mountain in hot weather. Although climbing the mountain was very difficult, landscape at the top of the mountain was very beautiful, and wind was very cool. We took a picture together as a remembrance. At night, we moved to the Siogama where there was a fireworks display. I think Japanese fireworks display is very impressive because lots of people come together to see it, drinking a beer and eating delicious Japanese foods. It is an interesting festival of summer night in Japan.

During the GCOE internship program, I could obtain some academic achievements as below.

International journal papers

- Chae-hyoung Kim, et al., "Effect of fuel injection location on a plasma jet assisted combustion with a backward-facing step," *Proceeding of the Combustion Institute, Vol. 33 (IF 3.256) is accepted and will be published.*

International conference papers

- Chae-hyoung Kim, et al., "Correlation of Fuel Injection Locations and Combustion in Unheated Supersonic Flow," *Tohoku-SNU Joint Workshop on Next Generation Aero Vehicle June 17-18, 2010, Tohoku University*

- Chae-hyoung Kim, et al., "Effect of a vent slot mixer with a plasma jet torch in unheated supersonic flow," *46th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, 25-28, July, 2010, Tennessee, USA.*

- Chae-hyoung Kim, et al., "Effect of fuel injection location on a plasma jet assisted combustion with a backward-facing step," *33rd International Symposium on Combustion, 1-6 August, 2010, Beijing, China.*