

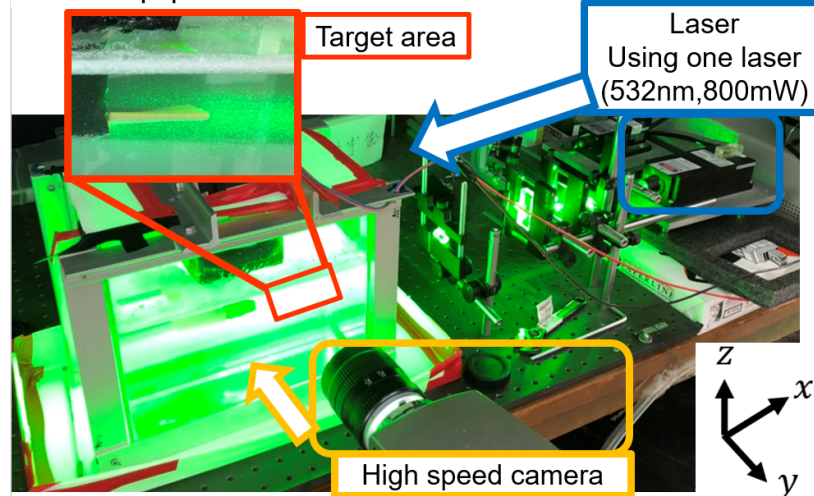
Research Topic	Flow visualization around the rotating blade with bubbles by using PIV	Graduate School of Engineering
Host University	National Taiwan University of Science & Technology / Taipei / Taiwan	Electrical, Electronic and Mechanical Engineering
Duration	From October 1 to December 20, 2019	NAKAMURA Yushi

Summary of the Research Activities

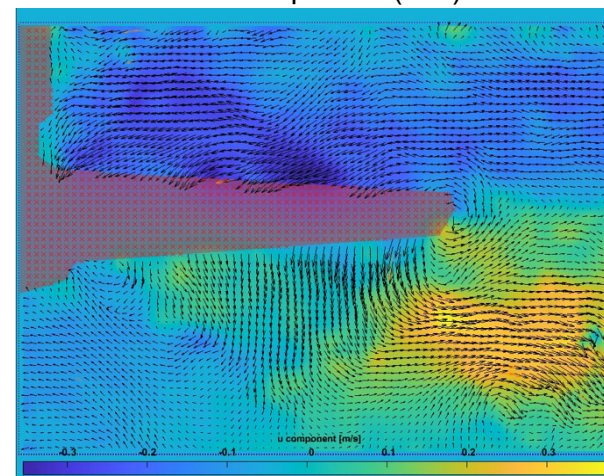
Turbo pumps for rocket engines operate at a high speed of approximately 40,000 rpm. At this speed, cavitation is one of the biggest problems because it induces serious vibration. However, the flow around bubbles is complicated and not well understood yet.

Therefore, the main objective of our research is to measure the flow of the cavitation. As the first step, I learned how to use the PIV (Particle Image Velocimetry) and visualize the flow around the blades rotating at a high speed. In this system, a particle tracer is seeded in fluid and captured by a high-speed camera when the laser sheet is illuminated. These pictures are analyzed and vectors are depicted as shown in the below-right figure. The blade was designed using NACA4412 airfoil and created using a 3D printer. I learned how to operate the laser, select the particles and set up the high-speed camera. During this period in Taiwan, I also analyzed CFD(Computational Fluid Dynamics) using ANSYS CFX and compared the results with the experiment.

■ Test equipment



■ Test result u component (m/s)



About lab & college life

At this university, there are many international students. So in our lab, we used English to communicate in our meetings. There are so many affordable and delicious restaurants around the university.

I had lunch and dinner with many friends every day.



指導教員講評

設定方法が難しい装置を使って、高度な実験を経験させてもらいました。この技術を流体機械研究室でも普及させてくれることを期待しています。

指導教員氏名：宮部 正洋 教授