DEPT AEROSPACE ENGINEERING
COLLEGE OF ENGINEERING

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: April 29, 2024

PROJECT TITLE: Velocity Measurement using Laser Based Techniques

Physical Requirement : Must lift 30 lbs
Project's Technical Skills Requirement : Although training will be provided, basic skills needed include experience with coding, such as python, LabVIEW, etc. and being a team player is required. Comfortable in a large-scale laboratory environment.
Project's Available Positions : 1

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Project Description

In order to predict the performance and structural requirements of aircraft it is essential to have accurate knowledge of both skin friction and heat transfer characteristics on the surface of these aircraft. To that end it is important to characterize the flow regimes which include turbulent jets and boundary layers to enable the skin friction and mixing that is responsible for drag of the aircraft. One technique is constant temperature anemometry (CTA), although this is the preferred technique the physical presence of a probe within the flowfield is a potential problem, especially when used in harsh environments. To that end laser Doppler anemometry (LDA) was developed. Unfortunately, LDA doesn’t have the resolution of CTA and also only measures at a single x,y,z, location. This was addressed with the development of particle image velocimetry (PIV) and although PIV also has the same restrictions, its full field capability offsets its lower resolution in general turbulent flows. This project will require the tracking of small particles in space and time; then using previously developed algorithm’s assemble them into a single package. The preferred approach is to use the python algorithms presently available in the public python libraries. The current project involves participation in a multiyear Navy Hypersonics program wherein our team is measuring the full field shear stress using liquid crystals on flat plates at Mach 4 and the AF Inlet distortion generator program.

This topic is open to all CEAS students. Although training will be provided, basic skills needed include experience with coding, such as python, LabVIEW, etc. and being a team player is required. Comfortable in a large-scale laboratory environment. In addition, there is a potential for the student to participate in technical publications at local and national levels. Dr.

Disimile’s UC-FEST laboratory is located off campus in Fairfield, Oh, approximately 30 minutes north of UC.