

Project Title: Experimental Study of Airfoils in the Wake of a Bluff Body

The successful operation of aircraft is critical to a wide variety of missions routinely performed by Navy Aircraft Carriers. Shipboard launch and recovery of aircraft are some of the most challenging, training-intensive and dangerous flight operations, due to factors like rolling and pitching decks, adverse weather conditions, and aircraft landing in the wake of superstructure of the ship. Flight characteristics of an aircraft are adversely impacted when it is in the wake of a ship superstructure, and the maneuverability and controllability of the aircraft becomes challenging. Therefore, the proposed investigation focuses on studying the aerodynamic behavior of an airfoil operating in the wake of a bluff body, in order to develop a deeper understanding of the adverse impact of large scale flow structures (i.e., eddies) on the flight characteristics of an aircraft. The experiments for this investigation will be performed in the water tunnel facility in the Department of Mechanical Engineering at California State University Northridge. For this investigation an automated system is being developed to accurately change the angle of attack of the airfoil in the wake of a bluff body. Such a system will allow for an accurate quantification aerodynamic performance of the airfoil when operating in wake of bluff body.

Project outcome for AIMS2 students:

- Learn about data acquisition system,
- Learn about data analysis using Matlab and Labview,
- Familiarize about the airfoil aerodynamics,
- Familiarize about water tunnel testing, and
- Learn about automation and how to precise control airfoil's angle of attack during testing