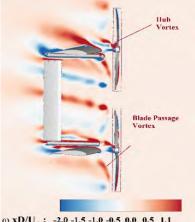
## **UAS Modeling and Simulations**

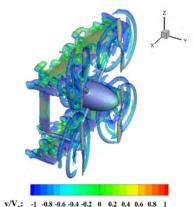
## Computational Fluid Dynamics (CFD) Lab, Department of Mechanical and Energy Engineering

- High-Fidelity Simulations of UAS Aerodynamic and **Acoustic Signature** 
  - Modeling the complex flow physics around a flying UAS using two In-house CFD solvers
  - Predicting the generated noise at far-field
- **Development of Physics-Based Reduced Order** Models
  - Integrated CFD and machine learning methods for fast predictions during UAS design steps to optimize the platform
  - Improve in-flight control mechanism using reduced order model
- **Development of Numerical Techniques for Modeling Extremely Morphing UAS platforms** 
  - Modeling new design UASs such as bird-inspired UAS using an innovative immersed boundary method
  - Modeling smart UAS with adjustable rotor and wing shapes . based on the flight condition
- **UAS Uncertainty Quantification and Risk Analysis** 
  - Non- intrusive methods including Monte Carlo (MC) without and with metamodel and polynomial chaos (PC) to study the environmental condition uncertainty
  - Developing hybrid uncertainty guantification techniques (intrusive and non-intrusive approaches) for multi physics problems

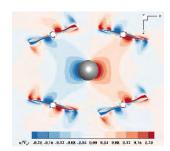
## **UAS Collisions with Flying Objects**

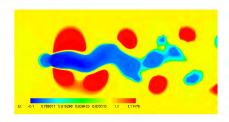
Modeling flying objects and their interactions with quadcopters using CFD coupled with Discrete Element Method

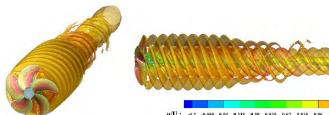




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