PhD student positions

The **Stochastic Hypersonics** group in the Department of Aerospace Engineering and Mechanics (AEM) at the University of Minnesota Twin Cities has funding for two PhD student positions starting in Fall 2024 at the earliest.

1) Development of a computational framework to learn gas-phase chemistry models from shock-tube data for hypersonic flight conditions

The successful candidate will develop a Bayesian inference framework capable of calibrating highly-dimensional fluid and radiation models from different shock-tube experimental data. In particular, we are interested in obtaining calibrated stochastic models for the underlying gas-phase chemistry. Two major contributions are foreseen. First, understanding and identifying all the unknowns affecting radiation measurements by means of spectroscopic techniques. This will allow us to have a reliable estimation of the uncertainty affecting the experimental data. Second, the development and integration of an efficient framework to obtain calibrated models considering general non-Gaussian noise models stemming from the experimental data.

2) Chemical kinetics model consolidation for relevant hypersonic flight environments

The objective of this project is to combine different measurements from shock-tubes and plasma wind tunnels to produce the best possible estimation of gas-phase chemical models consistent for both shock and boundary layers in hypersonic flows. The successful candidate will develop a computational framework capable of handling and integrating different types of experimental data and stochastic models. This project will work hand-in-hand with the previous project and they will both benefit from extensive collaboration.

Qualifications

- A BSc. or MSc. in Aerospace Engineering, Mechanical Engineering, Applied Mathematics or Computer Science is preferred.
- Skills in scientific computing (C++, Fortran and/or Python).
- Ability to work in a multidisciplinary, international research team and have strong verbal and written communication skills.
- Candidates have to meet the general requirements for graduate studies admission at the University of Minnesota (`https://cse.umn.edu/aem/prospective-students`)

How to apply

Interested candidates are encouraged to contact Dr. Anabel del Val at adelvalb@umn.edu including a brief description of your research interests and goals as well as a CV. Please include "PhD position - Stochastic Hypersonics" in the subject line of the email.

Why the Stochastic Hypersonics group

The Stochastic Hypersonics group led by Dr. Anabel del Val successfully blends stochastic methods within hypersonic flow research to advance the state-of-the-art models, simulations and experiments. Our research is truly interdisciplinary at the interface of applied mathematics and engineering. As a young research group, the successful candidate will have the opportunity to learn first-hand what it entails to build a new research program as well as contribute directly with new ideas. The group is also actively collaborating with international partners in Europe and the US which brings additional opportunities for networking and international travel. For more information, please go to: `https://stochastichypersonics.github.io`