



Vortex Workshop

Specially Invited Workshop
New Progress in Vortex Identification and
Applications

Sponsored by University of Texas at
Arlington, Texas, USA



3rd International Forum on
Aerospace and Aeronautics

December 11-13, 2023, San Diego, USA

Workshop Chairman

Prof. Chaoqun Liu

Professor, University of Texas at Arlington, Arlington, Texas, USA

Co-Chairs

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Announcement

The vortex workshop is open to all vortex-related research areas but not limited to aerodynamics. All vortex identification methods and all vortex-related applications in science and engineering are welcome to present.

Vortex is ubiquitous in universe such as tornado, hurricane, airplane tip vortex, polar vortex, and even star vortex in Galaxy. Vortices are also building blocks, muscles, and sinews of turbulent flows. A vortex is intuitively recognized as a rotational/swirling motion of fluids, but until recently had no rigidly mathematical definition. In 1858, Helmholtz first defined vortex is composed of so-called vortex filaments, which are infinitesimal vorticity tubes. The vorticity tube is called the first generation of vortex definition and identification, or G1. Although G1 has been accepted by the fluid dynamics community and almost all textbooks for over a century, we can find many immediate counterexamples. For example, in the laminar boundary layer, where the vorticity (shear) is very large near the wall, but not rotation (no vortex) exists. To solve these contradictions, many vortex criteria methods have been developed during the past 4 decades. More popular methods are represented by the Q , Δ , λ_2 , λ_{ci} criteria methods. These methods have achieved part of success in vortex identification, which are called second generation of vortex identification or G2. However, G2 has several critical drawbacks. First, they are all scalars which have no rotation axis directions, but vortex is a vector. It is hard or impossible to use a scalar to represent a vector. Second, like vorticity, these criteria methods are all contaminated by shear in different degrees. Third, they are all very sensitive on threshold selections. They are also unable to show the vortex structure when both strong and weak vortices coexist. The recently developed Liutex is called third generation of vortex definition and identification, or G3, which is a uniquely defined vector. Liutex has strong potential to be applied to all fluid-related research areas.

Nowadays, the crises human being faced are mainly caused by vortex, like global climate change, polar vortex, tornado, hurricane, environmental pollution, heart disease, etc. Therefore, accurate vortex definition and identification is one of the most challenging research topics for humanity.

The purpose of this special invited workshop is to get all experts, who are doing vortex-related research, around the world sitting together to report their new progress in vortex identification and applications including:

1. Mathematical definition and theories of vortex
2. Accurate vortex identification methods
3. Advances in unique and threshold free vortex core identification
4. New scientific findings by new vortex identification
5. Engineering applications of new vortex identification methods
6. Vortex control in scientific research and engineering applications

Welcome all scientists, engineers, and graduate students in any fluid-related research areas, who are interested in vortex research to submit the abstract through AeroForum2023 web site <https://www.continuumforums.com/2023/aeroforum>. The presentation will be hybrid with the ways of in-person or online. There are some discounts on the workshop registration (\$500 for in-person conference, \$300 for student in person and \$200 for virtual presentation)

All presenters will be invited to submit full papers to the workshop organizers for review and all qualified papers will be published by Springer-Nature as book chapters of the conference proceedings, which will be in EI index according to the agreement between the Springer-Nature and the organizers. **There is no additional charge to authors for publication of their book chapters.**

To register and confirm your participation for the vortex workshop, please visit the following link:

<https://www.continuumforums.com/2023/aeroforum/vortex-workshop-special-registration>

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