



UNIVERSITY OF  
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ARLINGTON

DEPARTMENT OF  
MATHEMATICS

### Liutex, Omega, Modified Liutex Omega Program User's Agreement

1. This program is a set of Fortran codes for calculating Liutex, Omega, and Modified Liutex Omega. This program was modified by Yifei Yu and Oscar Alvarez to a 6th-order program based on the codes developed by Yisheng Gao, Xiangrui Dong, and Chaoqun Liu.
2. This program is an intellectual property of the University of Texas at Arlington.
3. This is a research code. The authors are not responsible for any mistakes inside the code.
4. This program is released to the worldwide vortex and turbulence community for free and UTA and the authors have no liability and no responsibility for any possible loss or property damage caused by using these source codes.
5. Users who receive these codes have no copyright and cannot use them for any commercial purpose.
6. Users who receive these codes cannot sell or distribute them to any third party without getting permission in advance from Dr. Chaoqun Liu at UTA.
7. Any user's publications using this program or subroutines of this program must cite "This work is accomplished by using this code which is released by Chaoqun Liu at the University of Texas at Arlington."
8. Any user's publications using this program must cite related papers.

#### Papers related to Liutex:

- (1) Chaoqun Liu, Yisheng Gao, Shuling Tian, and Xiangrui Dong, Rortex—A new vortex vector definition and vorticity tensor and vector decompositions, *Physics of Fluids* 30, 035103 (2018).
- (2) Yisheng Gao and Chaoqun Liu, Rortex and comparison with eigenvalue-based vortex identification criteria, *Physics of Fluids* 30, 085107 (2018).
- (3) Chaoqun Liu, Yisheng Gao, Xiangrui Dong, et al., "Third generation of vortex identification methods: Omega and Liutex/Rortex based systems," *Journal of Hydrodynamics* 31(2), 205-223 (2019).

#### Papers related to Omega:

- (1) C. Liu, Y. Wang, Y. Yang and Z. Duan, "New Omega vortex identification method," *Sci. China Phys. Mech.* 59, 684711 (2016).
- (2) X. Dong, Y. Wang, X. Chen, Y. Zhang, C. Liu, Determination of epsilon for Omega vortex identification method, *Journal of Hydrodynamics*, Volume 30, Issue 4, pp541-548, August 2018.
- (3) Chaoqun Liu, Yisheng Gao, Xiangrui Dong, et al., "Third generation of vortex identification methods: Omega and Liutex/Rortex based systems," *Journal of Hydrodynamics* 31(2), 205-223 (2019).

#### Papers related to Modified Liutex Omega:

- (1) Xiangrui Dong, Yisheng Gao, and Chaoqun Liu, "New Normalized Rortex/Vortex Identification Method," *Physics of Fluids* 31, 011701 (2019).
- (2) Chaoqun Liu, Yiqian Wang, Yong Yang and Zhiwei Duan, "New Omega vortex identification method," *Sci. China Phys. Mech.* 59, 684711 (2016).
- (3) Liu, Jianming, and Chaoqun Liu. "Modified normalized Rortex/vortex identification method." *Physics of Fluids* 31.6 (2019): 061704.
- (4) Xiangrui Dong, Yiqian Wang, Xiaoping Chen, Yinlin Dong, Yuning Zhang, and Chaoqun Liu, Determination of epsilon for Omega vortex identification method, *Journal of Hydrodynamics*, Volume 30, Issue 4, pp541-548, August 2018.

Any violation of the above agreement may result in a lawsuit against the violator.

A. Releaser's name and address

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B. Receiver's name and address

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Signature:

Date: 12/18/2022

Signature:

Date: