

GUODAN DONG

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EDUCATION

Institute of Mechanics, Chinese Academy of Science

Ph.D.

Fluid Mechanics

2020.09 -

Supervisor

Xiaolei Yang

Nanjing University of Science and Technology

M.s.

Fluid Mechanics

2017.09 - 2020.04

Nanjing University of Science and Technology

B.S.

Safety Engineering

2012.09 - 2016.06

RESEARCH INTERESTS

- Fluid Mechanics
- Computational Fluid Dynamics
- Large Eddy Simulations
- Turbulence
- Richtmyer-Meshkov Instability
- Wind Wake Dynamics and Wake Meandering

PAPERS

- [1] **Guodan Dong**, Jianhua Qin, Zhaobin Li, and Xiaolei Yang^{*}. Characteristics of wind turbine wakes for different blade designs. *Journal of Fluid Mechanics*, 965:A15, 2023.
- [2] **Guodan Dong**, Zhaobin Li, Jianhua Qin, and Xiaolei Yang^{*}. Predictive capability of actuator disk models for wakes of different wind turbine designs. *Renewable Energy*, 188:269–281, 2022.
- [3] Jianhua Qin¹ and **Guodan Dong**^{1*}. The Richtmyer–Meshkov instability of concave circular arc density interfaces in hydrodynamics and magnetohydrodynamics. *Physics of Fluids*, 33(3):034122, 2021 (**Featured Articles**).
- [4] Jianhua Qin, **Guodan Dong**^{*}, and Hui Zhang^{*}. Control of a sedimenting elliptical particle by electromagnetic forces. *Physics of Fluids*, 33(3):033305, 2021.
- [5] **Guodan Dong**, Jianhua Qin, Zhaobin Li, and Xiaolei Yang^{*}. An inverse method for wind turbine blade design with given distributions of load coefficients. *Wind*, 2(1):175–191, 2022.
- [6] **Guodan Dong**, Zhaobin Li, Jianhua Qin, and Xiaolei Yang^{*}. How far the wake of a wind farm can persist for? *Theoretical and Applied Mechanics Letters*, 12(1):100314, 2022.
- [7] **Guodan dong**, Zeqing Guo, Jianhua Qin, Huanhao Zhang^{*}, Xiao-Hai Jiang, Zhi-Hua Chen, and Sha Sha. Numerical investigations of Richtmyer–Meshkov instability in different magnetic field configurations and the corresponding dynamic mode decomposition. *Acta Physica Sinica*, 68(16), 2019.
- [8] **Guodan Dong**^{*}, Huanhao Zhang^{*}, Zhenya Lin, Jianhua Qin, Zhihua Chen, Zeqing Guo, and Sha Sha. Numerical investigations of interactions between shock waves and triangular cylinders in magnetic field. *Acta Physica Sinica*, 67(20), 2018.
- [9] Zewei Wang, **Guodan Dong**, Zhaobin Li, and Xiaolei Yang^{*}. Effects of streamwise turbine spacing on wake characteristics of wind farms. *Boundary-Layer Meteorology*, 2023.
- [10] Zhaobin Li, **Guodan Dong**, and Xiaolei Yang^{*}. Onset of wake meandering for a floating offshore wind turbine under side-to-side motion. *Journal of Fluid Mechanics*, 934:A29, 2022.
- [11] Jianhua Qin, Andreopoulos Yiannis, Xiaohai Jiang, **Guodan Dong**, and Zhihua Chen^{*}. Efficient coupling of direct forcing immersed boundary-lattice Boltzmann method and finite element method to simulate fluid-structure interactions. *International Journal for Numerical Methods in Fluids*, 92(6):545–572, 2020.

- [12] Jianhua Qin, Xiaohai Jiang*, **Guodan Dong**, Zeqing Guo, Zhihua Chen, and Andreopoulos Yiannis. Numerical investigation on vortex dipole interacting with concave walls of different curvatures. *Fluid Dynamics Research*, 50(4):045508, 2018.
- [13] Zhaobin Li, **Guodan Dong**, Jianhua Qin, Zhideng Zhou, and Xiaolei Yang*. Coherent flow structures in the wake of floating wind turbines induced by motions in different degrees of freedom. *Acta Aerodynamica*, 40(4):231–239, 2022.

CONFERENCES

- **Guodan Dong**, Zhaobin Li, Xiaolei Yang. Evaluation on the predictive capability of actuator disk model in simulating different wind turbines of utility-scale, Wind Energy Science Conference, Germany, 2021
- **Guodan Dong**, Zhaobin Li, Jianhua Qin, Xiaolei Yang. Evaluation of the predictive ability of actuator disk models for Wake of different wind turbine designs, Chinese congress of theoretical and applied mechanics, Chengdu, 2022
- **Guodan Dong**, Jianhua Qin, Zhaobin Li, Xiaolei Yang. Numerical study on wakes of three different turbine blade designs, The 12th National Conference on Fluid Mechanics, Xi'an, 2022

SKILLS

- **Software:** VFS-Wind in-house 3D large eddy simulation code (wind turbine and wind farm simulations)
- **Programing:** C/C++ (VFS-Wind is writing in C++); Python (solving some PDEs, DMD, POD); Matlab (WFLO using genetic algorithm; Machine Learning practices)
- **Operation System:** Linux (in personal computer and super computer); Windows
- **Academic Tools:** Tecplot; Paraview; Matlab; Python; Zotero; L^AT_EX; Sublime
- **Commercial & Open Source Software:** Fluent; OpenFoam; OpenFast

HONORS & AWARDS

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|---|------------|
| • Second Prize of the 5 th Postgraduate Academic Forum of Institute of Mechanics | 2023 |
| • Pacemaker to Merit Student of Institute of Mechanics, Chinese Academy of Sciences | 2022 |
| • Merit Student of Institute of Mechanics, Chinese Academy of Sciences | 2021 |
| • Excellent Master Thesis of Nanjing University of Science and Technology | 2020 |
| • Outstanding Graduate Student of Nanjing University of Science and Technology | 2018, 2019 |
| • The first-class scholarship (three times) | 2017-2019 |

RESEARCH EXPERIENCES

- **BEMID V1.0:** The C++ code for wind turbine blade designs based on the blade element momentum method (BEM) and the multi-dimensional Newton's Method are developed.
- **Wake meandering:** The inflow large eddy induced wake meandering and shear layer instability induced wake meandering of different utility-scale wind turbines are compared and investigated under different turbulent inflows.
- **Turbine blade parameterization method (ADR, ADNR, and AS methods):** The predictive capability of wind turbine blade parameterization method are investigated and the proper orthogonal decomposition (POD) method is used to investigate the wake dynamics.
- **Wind farm layout optimization (WFLO):** WFLO using genetic algorithm is investigated based on the Jensen wake model.
- **Shock induced Richtmyer-Meshkov instability (RMI):** The mechanism of the suppression of the RMI in the magnetohydrodynamics are investigated and the dynamic model decomposition (DMD) is used.