Shizheng WEN

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EDUCATION

College of Energy and Power Engineering, Nanjing University of Aeronautics and Astronautics (NUAA), Nanjing

- Bachelor in Aircraft Power Engineering; **Overall GPA: 93/100 (3/247)**; Aug 2016 - Jul 2020
- **Core Courses: Engineering:** Engineering Thermodynamics (95), Heat Transfer (93), Fluid Mechanics Engineering (93), Materials Mechanics (90), Engineering Elasticity (90), Theoretical Mechanics (90), Mechanical Vibration foundation (92), Electrical and Electronic Technology (90), Automatic Control (85)

  Math & Physics: Advanced Mathematics (100), Programming of C++ Language (100), Linear Algebra (99), Probability Theory and Mathematical Statistics (91), Complex Function (93), University Physics (97), Basic Chemistry Engineering (98)

Duke University, NC Jul 2019 - Sep 2019

- Duke Undergraduate Visiting Researcher, advised by Professor **Earl H. Dowell** (Elected Member. National Academy of Engineering)

PUBLICATIONS

- **Shizheng Wen,** Xianglei liu, Sheng Cheng, Zhoubing Wang, Shenghao Zhang, Chunzhuo Dang, "Ultrahigh thermal rectification based on near-field thermal radiation between dissimilar nanoparticles", *J. Quant. Spectrosc. Radiat. Transfer* **234,** 1-9 (2019)
- **Shizheng Wen**, Michael W. Lee, Kai M. Kruger Bastos, Earl H. Dowell, "Application of Convolutional Neural Network in Feature Identification for Complex Fluid Flows", under review by *AIAA Journal*

AWARDS

- Chancellor's Honorary Scholarships, NUAA (the highest honor for undergraduate student) Nov 2019
- National Scholarship, Ministry of Education of P.R. China (top 1%) Sep 2019
- Boeing Scholarship, Boeing Aerospace company (16 among the whole university) Nov 2018
- Excellent summer research report prize, NUAA (10 among the whole university) Dec 2017

RESEARCH EXPERIENCE

Application of Machine Learning in Feature Identification for Complex Fluid Flow | Undergraduate Researcher Jul 2019 - Sep 2019

Advisor: **Earl H. Dowell**, William Holland Hall Professor, Department of Mechanical Engineering & Materials Science, Duke University

- Trained a convolutional neural network (CNN) that was able to recognize several qualitatively different subsonic buffet flows over a high-incidence airfoil.
- Verified the capability of the CNN to identify large-scale coherent structures in agreement with those known to be associated with buffet flows by analyzing the convolutional kernels and corresponding feature maps.
- Explored the sensitivity to hyperparameters including network architecture and convolutional kernel size.
- Trained a long-short term memory CNN and demonstrated that with the inclusion of temporal information, the coherent structures remained qualitatively comparable to those of the conventional CNN and less dynamically significant features were no longer recorded.
- **Contributed to a first-author paper** to be submitted to AIAA Journal (leading research journal in Aerospace Engineering).

Near-field Radiation-based Thermal Rectifiers | Undergraduate Researcher Sep 2017 - Sep 2018

Advisor: **Xianglei Liu**, Professor, Department of Combustion Heat Transfer and Thermal Energy System, NUAA

- Proposed a thermal rectifier based on near-field radiation between nanoparticles made of intrinsic silicon and a dissimilar material, and a record-high rectification ratio of more than 10^4 is theoretically demonstrated.
- Simulated the near-field thermal radiation between nanoparticles with irregular shapes by using the thermal discrete dipole approximation (TDDA), and investigated effects of gap distances, temperatures and configurations of nanoparticles on the performance of thermal rectifiers and explained the mechanism.
- Explored rectification ratios of ten different material pairs and proposed a criterion for other researchers to choose materials for thermal rectifiers with high performance.
- **Published a first-author paper** that was accepted by JQSRT (leading research journal in Radiative Transfer).

SKILLS/INTERESTS

- Solid expertise in Python, Matlab, C++, and various machine learning algorithms (tensorflow); ANSYS (finite element analysis); SPSS, LINGO; Multisim, ProE and AutoCAD
- Hobbies: Violin, Guitar, Tennis, Soccer, Billiards, Swimming, Music, Rubik's Cube