Chia-Wei Kuo

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Education

University of Wisconsin – Madison **Madison, WI**
Ph.D. in Mechanical Engineering, Minor in Mathematics Sep 2016 - Present
- Emphases: Theoretical Modeling, Two-Phase Flow Simulations, Adaptive Mesh Refinement
- Honor: Phi Kappa Phi Member (Top 10% Graduate)

National Taiwan University **Taipei, Taiwan**
M.S. in Mechanical Engineering Feb 2014 - Jan 2016
- Emphasis: Numerical Heat Transfer, Totally-Enclosed Fan Cooled Motor Frame Design

National Cheng Kung University **Tainan, Taiwan**
B.S. in Aerospace Engineering Sep 2006 - June 2010
- Honor: Phi Tau Phi Member (Top 1% Undergraduate); National Science Council Scholarship

Technical Skills

Computational Fluid Dynamics: OpenFOAM, Fluent, CFX, ICEMCFD
Programming: C++, C, FORTRAN, MATLAB, JAVA, OpenMP, MPI, CUDA
Solar Thermal Engineering: TRNSYS
Computer-Aided Engineering: AutoCAD, Solidworks, Pro/E
Statistics: R, SPSS

Professional Experiences

Delta Electronics, Taiwan Feb 2016 - Apr 2016
Senior Mechanical Engineer, Fan and Thermal Business Group
- Developed the next-generation GBR-series bathroom ventilation fans
- Provided product maintenance for the current GBR-series ventilation fans
- Designed the accessory kit packages of GBR, SMT, and SLM-series ventilation fans

National Cheng Kung Univ. Energy Research Center, Taiwan Aug 2011 - Dec 2013
Assistant Researcher, Solar Thermal Research Team
- Pioneered the solar diffuse fraction research work in Taiwan
- Established the typical meteorological year database for Taiwan
- Efficiency analysis of large-scale solar thermal systems in swimming pool application
- Optical analysis and design of a new C-shaped compound parabolic solar thermal collector

Taiwan Air Force Aug 2010 - Jul 2011
Second Lieutenant, 3^{rd} Air Logistics Command
- Edited the maintenance reports for the engine component repair work
- Translation of manufacturer documents

Doctoral Research

Two-Phase Flow Spray Model
Advisor: Prof. M. Trujillo *Sponsor: Caterpillar Inc.*

MASTERS' THESIS

An improvement in the heat dissipation through the frame design of the totally enclosed fan cooled (TEFC) motor

Advisor: Prof. M.J. Huang *Sponsor: TECO Electric and Machinery Co.*

- Developed the TECO next-generation large-scale industrial totally enclosed fan cooled (TEFC) motor possessing higher heat dissipation performance (T_{max}<403K, T<10K).
- Proposed 2 types of new motor designs: one having higher heat transfer rate/flow resistance, while lower heat transfer rate/flow resistance for the other.
- Optimized the fin spacing through analytical approaches and numerically attempt 8 types of new fin designs.
- AutoCAD/Solidworks drawing, hybrid meshing using structured and unstructured grids, pc-cluster parallel computing along with the customized boundary conditions.

UNDERGRADUATE PROJECT

Design of an hypersonic reflective shock tunnel

Advisor: Prof. K.C. Chang *Sponsor: National Science Council of Taiwan*

- Aided the technician in drawing and revising 40 sheets of engineering blueprints on the hypersonic shock tunnel.
- Planned and constructed the 1st laboratory for conducting supersonic combustion experiments on a university campus.

PROFESSIONAL ACTIVITIES

Reviewers for 2020 ASME Internal Combustion Engine Fall Conference; 4^{th} Thermal and Fluids Engineering Conference; Society of Automotive Engineers International.

GRADUATE COURSEWORK

Mechanical Engineering:

- Ideal Fluid Flows, Turbulent Flows, Viscous Flows, Compressible Flows, Intermediate Fluid Dynamics
- Intermediate Thermodynamics, Advanced Thermodynamics, Heat Transfer, Heat Conduction and Radiation
- Computational Fluid Dynamics, High Performance Scientific Computing,

Mathematics: Numerical Linear Algebra, Methods of Computational Mathematics (II), Methods of Applied Mathematics (I)(II)

DOCTORAL COURSE PROJECTS

Green's function solutions for 2D non-homogenous diffusion equations

Course: Methods of Applied Mathematics (I) Nov 2018 - Dec 2018

- Derived the analytical solutions to a 2D inhomogeneous transient diffusion problem and a linear advection-diffusion problem using the Green's function.
- Extended this approach to identify the four different flow structures naturally existing in the two-phase flow simulations.

Parallelizing a two-phase advection equation solver using OpenMP, MPI and CUDA

Course: High Performance Scientific Computing Nov 2017 - Dec 2017

- Implemented multi-core (OpenMP), multi-node (MPI) and GPU (CUDA) parallelizations of a GALS based two-phase advection solver
- Demonstrated a speedup of 47.5X on GPUs and 22.4X on CPUs

VOLUNTEERING

Asian Mental and Health Association Feb 2014 - May 2014

Assistant

PUBLICATIONS

Journal Publications

1. C.W. Tseng, **C.W Kuo**, M. Trujillo and C. Rutland. "Evaluation and validation of large-eddy simulation sub-grid spray dispersion models using high-fidelity volume-of-fluid simulation data and engine combustion network experimental data." International Journal of Engine Research, 2018.
2. **C.W. Kuo** and K.C. Chang. "In-situ measurements of solar diffuse fraction in southern Taiwan," Journal of the Chinese Institute of Engineers, 2015.
3. **C.W. Kuo**, W.C. Chang and K.C. Chang. "Modeling the hourly solar diffuse fraction in Taiwan," Renewable energy, 2014.
4. **C.W. Kuo**, P.S. Yen, W.C. Chang and K.C. Chang. "The design and optical analysis of compound parabolic collector," Procedia Engineering, 2014.
5. **C.W. Kuo**, W.C. Chang and K.C. Chang. "Distribution of solar diffuse fraction in Taiwan," Energy Procedia, 2014.

Conference Proceedings

1. **C.W. Kuo** and M. Trujillo. "Revisiting the Promise of Adaptive Mesh Refinement," ILASS-Americas 31^{th} Annual Conference on Liquid Atomization and Spray Systems, Madison, WI, 2020.
2. **C.W. Kuo** and M. Trujillo. "Speedup Analysis of Adaptive Mesh Refinement in the Simulation of Spray Formation." ILASS-Americas 30^{th} Annual Conference on Liquid Atomization and Spray Systems, Tempe, AZ, 2019.
3. **C.W. Kuo** and M. Trujillo. "Benefits of AMR for Atomization Calculations." 14^{th} Triennial International Conference on Liquid Atomization & Spray Systems (ICLASS), Chicago, IL, 2018.
4. **C.W. Kuo** and M.J. Huang. "Fin designs of TEFC motor: heat dissipation enhancement," The 22^{th} National Computational Fluid Dynamics Conference, New Taipei, Taiwan, 2015.
5. P.S. Yen and **C.W. Kuo**. "Policy for solar water heaters in Taiwan: An International Perspective," Grand Renewable Energy, Tokyo, Japan, 2014.
6. **C.W. Kuo**, P.S. Yen and K.C. Chang. "Generation of typical solar radiation 2014 year for Taiwan," Grand Renewable Energy, Tokyo, Japan, 2014.
7. **C.W. Kuo**, K.C. Chang and P.W. Chen. "In situ analysis of solar diffuse fraction in Tainan," The 30^{th} Conference of the Chinese Society of Mechanical Engineers, Yilan, Taiwan, 2013.
8. **C.W. Kuo**, Y.C. Liu and W.C. Chang. "Modeling of heat transfer in an industrial electric oven," The 20^{th} National Computational Fluid Dynamics Conference, Nantou, Taiwan, 2013.
9. **C.W. Kuo**, I.M. Liu and T.S. Li. "Optimization of large-scale solar thermal systems: A case study," The 19^{th} National Computational Fluid Dynamics Conference, Penghu, Taiwan, 2012.