

# Tao Fang

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## EDUCATION

### Georgia Institute of Technology (GT)

Doctor of Philosophy in Mechanical Engineering

Advisor: Dr. S. Mostafa Ghiaasiaan

Tentative Dissertation: The Effects Of Tilt Angle On Acoustic-Stirling (Pulse Tube) Cryocoolers

Atlanta, GA

Pursuing

### Carnegie Mellon University (CMU)

Master of Science in Mechanical Engineering

Advisor: Dr. Satbir Singh

GPA: 3.93/4

Pittsburgh, PA

May 2015

### Huazhong University of Science and Technology (HUST)

Bachelor of Science in Thermal and Power Engineering

GPA: 3.53/4

Wuhan, Hubei, China

June 2013

## RESEARCH PROJECTS

### Compressible LES Simulation of Jet and Engine Valve-assembly flow

Advisor: Dr. Satbir Singh

- Performed compressible LES simulation of highly turbulent planer jet using CFD code OpenFOAM
- Implemented Vreman Large Eddy Simulation (LES) model in OpenFOAM using C++.
- Compared mean velocity and RMS with experiment to determine the efficient combination of numerical scheme and LES model for highly turbulent planer jet and valve-assembly simulation.

Fall 2014-May 2015

CMU

### Predictions of Flow Separation at Engine Valve Gap for Port-flow

Advisor: Dr. Satbir Singh

- Modeled compressible turbulent engine port-flow using RANS model and CFD code CONVERGE.
- Analyzed flow condition and turbulent flow separation mechanism.
- Investigated meshing topology, boundary layer refinement and mesh alignment.
- Predicted flow separation which was hard in previous works using proper meshing methodology, improved the predictions of flow rate reduction caused by turbulent flow separation by 54%.

Fall 2013-Spring 2014

CMU

### Analysis of Non-uniform Heat Loads on Evaporators with Loop Heat Pipe (LHP)

Advisor: Dr. Tingzhen Ming

- Developed and implemented an innovative dynamic mesh model which can dynamically predict the position of liquid-gas interface and calculate phase change in porous medium.
- Performed steady-state LHP evaporator CFD simulation, predicted liquid and gas region in porous medium under non-uniform and complex heat flux which was not possible in previous works.
- Investigated the impact of heat concentration on the performance of LHP evaporators using the new model and ANSYS FLUENT, determined optimal work condition.

Fall 2012-Spring 2013

HUST

## COURSE PROJECTS

### Comparison of CFD numerical schemes

Course: Numerical Method in Engineering & Computational Fluid Dynamic

- Led a team of two people, developed a CFD code to solve test cases using MATLAB.
- Implemented Finite Difference Method, Finite Volume Method (using staggered grid), SIMPLE algorithm, SIMPLER algorithm and PISO algorithm.
- Investigated the coding difficulty, solution accuracy, computational expense and mesh adaptability of Finite Difference Method and Finite Volume Method.
- Researched the computational expense and solution accuracy of SIMPLE, SIMPLER and PISO.

Fall 2013-Spring 2014

CMU

**COURSE  
PROJECTS  
(Continue)**

- Fractal Geometry Generation and Surface Reconstruction** Spring 2014  
Course: Computer-aided Design CMU
- Developed a code to generate Cartesian grid and detect/reconstruct overlap geometry outer surface using Octree grid generation method, Alternating Digital Tree (ADT) spatial data structure, Marching Cubes algorithm and Sutherland–Hodgman algorithm.
  - Investigated the computational expense and solution accuracy of Marching Cubes algorithm and Sutherland-Hodgman algorithm.
  - Designed and developed automatic fractal geometry generation software with two teammates.
- System Analysis of Solid-Oxide Fuel Cell/Gas Turbine Hybrid System** Fall 2014  
Course: Fuel Cell System CMU
- Performed thermodynamic system analysis on solid-oxide fuel cell and gas turbine hybrid power system, analyzed and plotted energy efficiency, component cost and levelized cost.
  - Optimized system design, reduced minimum levelized cost of electricity (LCOE) by 1.26 cents/kWh, and determined the optimal working boundary conditions.
- Design of N25-3.5/435 Steam Turbine Cylinder** Spring 2012  
Course: Steam Turbine Design HUST
- Designed a 25MW steam turbine cylinder with reheat cycle.
  - Calculated and determined system thermodynamic cycle, stage diameters, flow area, blade number, blade height/width, blade angle and efficiency.
  - Prepared product handout and thermodynamic system drawings.
- Double-stage Gear Reducer Design** Fall 2011  
Course: Mechanical Design HUST
- Designed a double-stage gear reducer for a motor-driven conveyor under moderate shock and dust condition, drawn assembly drawings and part drawings using AutoCAD, prepared product handout.
  - Calculated and determined the design of transmission system, gear, bearing, drive shaft, shaft coupling, key and gearbox casing.

**WORKING  
EXPERIENCE**

- Georgia Institute of Technology** Atlanta, GA  
Graduate Research Assistant Aug 2015 - present
- Carnegie Mellon University** Pittsburgh, PA  
Graduate Teaching Assistant Sep 2014 – May 2015
- Provided support and instruction to students on a variety of complex subjects and trained them to be skilled user of ANSYS Fluent and ICEM
  - Holden office hours and graded homework
  - Assisted preparing course content and designed homework problems and tutorials
- Changyuan Thermal Power Plant** Jinmen, Hubei, China  
Summer Intern July 2012 – Aug 2012
- Monitored and controlled thermal power generating units according to current network load
  - Inspected field equipment and secured normal operation
  - Coordinated communication between field and control room

**PUBLICATIONS**

- [1] **Fang T**, Singh S. Predictions of Flow Separation at the Valve Seat for Steady-State Port-Flow Simulation[J]. *Journal of Engineering for Gas Turbines and Power*, 2015, 137(11): 111512.
- [2] **Fang T**, Ming T, Tso C P, et al. Analysis of non-uniform heat loads on evaporators with loop heat pipes [J]. *International Journal of Heat and Mass Transfer*, 2014, 75: 313-326.
- [3] Shen W, Cheng Z, Li C, **Fang T**, Fan A, Liu W. Combustion characteristics of methane/air mixture in micro-scale combustors with different bluff-bodies [J]. *Renewable Energy Resource*, 2012, 30: 10.