



ThermoFluids Research Group



GROUP INTRODUCTION

The Thermo-Fluids Research Group at Capital University of Science and Technology involves multidisciplinary researchers with a clear focus on both fundamental and applied research in thermo-fluids including Multiphase Flows, HVAC, Sprays and Combustion, Computational Fluid Dynamics, Aerodynamics, Turbulence, Renewable Energy and Thermal & Hydraulic Augmentation.

GROUP HEAD

Dr. Muhammad Mahabat Khan

Dr. Muhammad Mahabat Khan has done his Ph.D. in Computational Fluid Dynamics from Ecole Centrale de Lyon, France. He has worked as Advanced Development Engineer in Continental Automotive, France for more than five years. He was rewarded with research grant worth £20,000 at University of Leeds for developing Post Processing Methodology for Turbulent Flows in engines. He is also recipient of research award worth €2.3 million from Continental Automotive, France. His research interests include; Large Eddy Simulation of Turbulent Flows, Modeling and Simulation of Fuel Injection Systems, Multiphase Flows, Heat Transfer Enhancement etc. He is also reviewer of famous International Journals like:



1. International Journal of Heat and Mass Transfer, Elsevier
2. Energy Conversion and Management, Elsevier
3. Atomisation and Sprays, Begellhouse.

Currently he is serving as Assistant Professor in department of Mechanical Engineering at Capital University of Science & Technology, Islamabad.

RESEARCH AREAS

- Atomization and sprays
- Large Eddy Simulation of Turbulent Flows
- Coherent Structures in Turbulent Flows
- Multiphase Flows, Free Surface Flows and Particulate Flows
- Combustion and Heat transfer Enhancement
- Ejector Refrigeration
- Phase Behavior and Phase Change
- Heat Exchangers
- Refrigeration and Air Conditioning

Group Members

1. Dr. M. Mahabat Khan
2. Dr. Saif ur Rahman
3. Dr. Khawar Naveed
4. Dr. Muhammad Irfan
5. Mr. Saif Ullah
6. Mr. Atif Bin Asghar
7. Engr. Muhammad Ahmed
8. Engr. Madeeha Khan

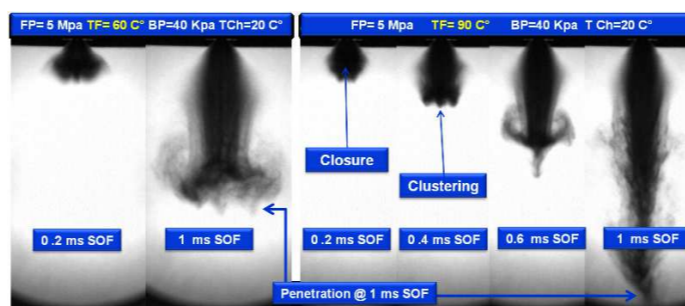
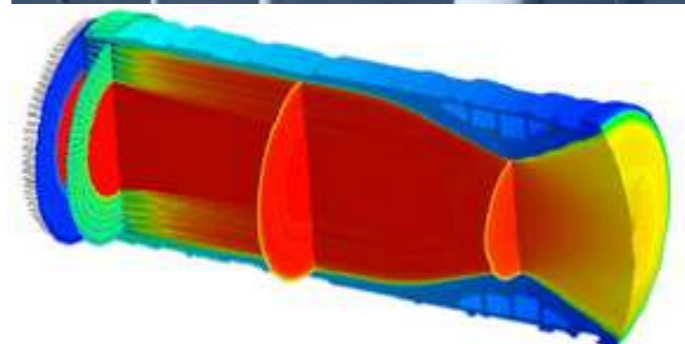
MS/PhD Students

MS Students

1. Mr. Liaqat Hussain
2. Mr. Fakharul Hasnain
3. Ms. Madeeha Khan
4. Mr. Muhammad Ahmed
5. Mr. Rehan Qaiser
6. Mr. Amani Room

PhD Students

1. Mr. Rizwan Sabir
2. Mr. Noman Bashir
3. Mr. Shahid Shafiq



ALUMNI

Mr. Abubakar Ayub

Thesis Title: Exergetic optimization and comparison of combined gas turbine supercritical CO₂ power cycles
Year: 2018

Mr. Rizwan Bhatti

Thesis Title: Numerical study of hydrogen peroxide thermal decomposition in a shock tube
Year: 2017

Selected Publications

Journal Publications

- M. M. Khan, J. Hélie, and M. Gorokhovski, "Computational methodology for non-evaporating spray in quiescent chamber using Large Eddy Simulation", *International Journal of Multiphase Flow*, vol. 102, pp. 102–118, 2018.
- M. M. Khan, N. A. Sheikh, A. Khalid, and W. A. Lughmani, "Experimental characterization of sprays under highly evaporating conditions", *Heat and Mass Transfer*, vol. 54, no. 5, pp. 1531–1543, 2018.
- M. Irfan and M. Muradoglu, "A Front Tracking Method for Particle-Resolved Simulation of Evaporation and Combustion of a Fuel Droplet", *Computers and Fluids*, vol. 174, pp. 283–299, 2018.
- A. Ayub, N. A. Sheikh, R. Tariq, M. M. Khan, and C. M. Invernizzi, "Exergetic Optimization and Comparison of Combined Gas Turbine Supercritical CO₂ Power Cycles", *Journal of Renewable and Sustainable Energy*, vol. 10, no. 4, p. 044703, 2018.
- E. Khalid, S. Manzoor, N. A. Sheikh, M. Ali, H. M. Ali, and M. M. Khan, "Numerical Investigation of Transient Response of a Coupled Two Degrees of Freedom Symmetric Airfoil before Flutter", *International Journal of Aeroacoustics*, vol. 17, no. 3, pp. 275–294, 2018.
- M. Irfan and M. Muradoglu, "A front-tracking method for direct numerical simulation of evaporation process in a multiphase system", *Journal of Computational Physics*, vol. 337, pp. 132–153, 2017.
- M. M. Khan, J. Hélie, M. Gorokhovski, and N. A. Sheikh, "Experimental and Numerical study of Flash Boiling in Gasoline Direct Injection Sprays", *Applied Thermal Engineering*, vol. 123, pp. 377–389, 2017.
- M. M. Khan and N. A. Sheikh, "Experimental characterization of sprays under highly evaporating conditions", *Journal of Mechanical Science and Technology*, vol. 31, no. 4, pp. 1–13, 2017.
- M. M. Khan, J. Helie, M. Gorokhovski, and N. A. Sheikh, "Air Entrainment in Multi hole Gasoline Direct Injection Sprays", *Journal of Applied Fluid Mechanics*, vol. 10, no. 4, pp. 1223–1234, 2017.
- M. Ali, M. H. Iqbal, N. A. Sheikh, H. M. Ali, S. Manzoor, and M. M. Khan "Performance investigation of air velocity effects on PV modules under controlled conditions", *International Journal of Photoenergy*, vol. 2017, pp. 1–10, 2017.
- M. R. Bhatti, N. A. Sheikh, S. Manzoor, and M. M. Khan, "Numerical studies of Hydrogen Peroxide Thermal Decomposition in a Shock Tube using OpenFOAM", *Journal of Thermal Science*, vol. 26, no. 3, pp. 235–244, 2017.
- A. Mustafa, A. Erten, R. M. A. Ayaz, O. Kayilioglu, A. Eser, M. Eryurek, M. Irfan, M. Muradoglu, M. Tanyeri, and A. Kiraz, "Enhanced dissolution of liquid microdroplets in the extensional creeping flow of a hydrodynamic trap", *Langmuir*, vol. 32, no. 37, pp. 9460–9467, 2016.