

## EDUCATIONAL HISTORY

<b>Doktor-Ingenieur (Dr.-Ing.) (Doctor Engineer)</b> Institute of Thermodynamics, University of Bundeswehr, Munich, Germany	<b>2017</b>
<b>M.Engg in Mechanical Engineering (Energy Systems) ( 2<sup>nd</sup> Position, 3.7 CGPA)</b> NED University of Engineering & Technology, Karachi	<b>2011</b>
<b>B.E in Mechanical Engineering (7<sup>th</sup> Position, 81.5%)</b> NED University of Engineering & Technology, Karachi	<b>2009</b>

### Technical Training Courses

- ANSYS software certification (30 hrs course)
- Computational Thermo-Fluid Mechanics (30 hrs course)
- Effective Teaching Methodologies

## PHD THESIS

### “Modeling of Turbulent Premixed Combustion using LES and RANS Methods”

- Modelling and simulation of complex processes of turbulent premixed combustion for varied pressures, inlet conditions of flow and turbulent length scales.
- A novel LES sub-grid Flame Surface density model is used to investigate various features of significant importance e.g. counter-gradient sub-grid scalar flux, pressure and Lewis number effects.
- The performance of the simplified version of the model is investigated.
- RANS version of the model is developed and investigated its performance in comparison to the original model and well documented experimental data.

## MASTER DISSERTATION

### “The Simulation of Turbulent Axisymmetric Impinging Jets using RANS Methods”

- Numerically investigated the flow field and heat transfer augmentation via axisymmetric detached rib-roughners in single and multiple jets impingement with and without cross-flow interactions
- Examined the influence of jet Reynolds number, jet-outlet-to-target wall distance, blowing ratio, rib clearance ratio, rib width and rib height
- Did the validation of numerical predictions with the relevant experimental data and performed Grid Sensitivity analysis through GCI method to reduce the discretization errors
- The presence of detached ribs showed a significant augmentation in heat transfer in single jet impingement without cross-flow and enhanced peak Nusselt number in single and multiple jets impingement with detached ribs and cross-flow at moderate cross-flow velocities.

## FINAL YEAR PROJECT

### “Design and Feasibility of an Alternate Air Conditioning System at HUB Power Plant”

- Prepared a detailed Feasibility Report for replacing existing Vapor Compression Chiller with more economical chiller i.e. Vapor Absorption/Centrifugal Chiller and explored a potential annual saving of Rs. 5 Million
- Did designing of major components and prepared a lay out of the piping system of the new system.

## PROFESSIONAL EXPERIENCE

**NED University of Engineering & Technology, Karachi**

**Feb.09 ~ Present**

Currently working as an Assistant Professor in Mechanical Department at NEDUET. The job responsibilities includes:

- Conducting theory and practical classes of different subjects related to mechanical engineering
- Supervising different undergraduate, postgraduate, industrial and research projects

## ADMINISTRATIVE RESPONSIBILITIES

**Currently also working as a Director of NED-DICE Energy Innovation Centre with a mission:**

- To encourage and promote Energy related innovations throughout the country and transform them into commercial products and services and to serve as R&D wing for industry to help solve their energy related problems
- To empower our nation to address its Energy/Water problems through innovative solutions.

**Worked as an ASME Faculty Coordinator of ASME NEDUET Section which had responsibilities of:**

- Organized a variety of activities of technical content and professional and personal values
- Prepared students to participate in International, National and Local activities arranged by ASME
- Created a professional and practical approach in the young engineers by engaging them in different activities of ASME

## DESIGN AND FABRICATED PROJECTS

- Design and Fabrication of Solar Water Geyser at Staff Washrooms of Mechanical Engineering Department
- An Alternate /Supporting Heating and Cooking System for Staff Canteen using Renewable Energy
- Design a Cost Effective Air Conditioning System for the Labs of Mechanical Engineering Department

## TECHNICAL SKILLS

- Proficiency in ICEMCFD, CFX, Fluent, OpenFOAM, Tecplot and Paraview.

## SUBJECTS OF INTEREST

- |                                |                    |                  |
|--------------------------------|--------------------|------------------|
| • Computational Fluid Dynamics | • Fluid Mechanics  | • Thermodynamics |
| • Heat Transfer                | • Renewable Energy | • Combustion     |

## RESEARCH PUBLICATIONS

### Year 2018

- U. Allauddin, M. Pfitzner, “Development of a RANS premixed turbulent combustion model based on the algebraic flame surface density concept” Journal of Engineering for Gas Turbines and Power, vol. 141(2), 2018.
- U. Allauddin, M. Mahrukh, N. U. Rehman, M. E. Haque, N. Uddin, “Numerical Investigation of Heat Transfer by an Impinging Jet using Alumina-water Nanofluid”, accepted in Numerical Heat Transfer, part A, 2018.

- U. Allauddin, M. Pfitzner, “Investigation of pressure and the Lewis number effects in the context of flame surface density closure for LES of premixed turbulent combustion”, submitted to Journal of Engineering for Gas Turbines and Power, 2018.
- M. Mahrukh, U. Allauddin, M. E. Haque, N. Uddin, A numerical investigation of flow over single and three tandem square cylinders at Reynolds number of 22000, submitted to Iranian Journal of Science and Technology, Transactions of Mechanical Engineering, 2018.

#### **Year 2017**

- U. Allauddin, M. Klein, M. Pfitzner, N. Chakraborty, “A-priori and a-posteriori analysis of algebraic flame surface density modelling in the context of large eddy simulation of turbulent premixed combustion”, Numerical Heat Transfer, part A, vol. 71(2), pp. 153-171, 2017.

#### **Year 2016**

- P. Janas, U. Allauddin, M. Pfitzner, B. Boehm, A. Kempf, “Numerical investigation of the influence of different valve seat geometries on the in-cylinder flow and combustion in spark ignition engines”, abstract accepted for LES4ICE, Rueil-Malmaison, France, November 2016.

#### **Year 2015**

- M. Klein, U. Allauddin, R. Keppeler, M. Pfitzner, “Towards uncertainty quantification and quality assessment for large eddy simulation of turbulent premixed combustion”, In Uncertainty Quantification in Computational Fluid Dynamics, Paris, France, May 2015.

#### **Year 2014**

- R. Keppeler, E. Tangermann, U. Allauddin, M. Pfitzner, “LES of low to high turbulence combustion in an elevated pressure environment”, Flow Turbulence Combustion, vol. 92, pp. 767-802, 2014.
- U. Allauddin, R. Keppeler, M. Pfitzner, “Turbulent premixed LES combustion models based on fractal flame surface density concept”, ASME paper GT2014-25919, Proc. ASME Turbo Expo, Düsseldorf, Germany, June 2014.
- U. Allauddin, M. Klein, M. Pfitzner, N. Chakraborty, “A-priori and a-posteriori analysis of algebraic flame surface density modelling in the context of large eddy simulation of turbulent premixed combustion”, Proc. SPEIC 14 – Towards sustainable combustion, Lisboa, Portugal, November, 2014.

#### **Year 2013**

- U. Allauddin, N. Uddin, S. O. Neumann, “Heat transfer enhancement by detached-ribs on a flat surface subjected to jet impingement”, Numerical Heat Transfer, part A, vol. 63, pp. 921-940, 2013.
- U. Allauddin, N. Uddin, “Heat transfer enhancement by detached-ribs on a surface subjected to jet impingement”, J. Thermophysics Heat Transfer, vol. 27, pp. 355-359, 2013.
- U. Allauddin, M.A. Siddiqui, S.A. Raza, H.B. Kakar, “Assessment of coal gasification technologies potential for Sindh coal reservoirs”, Proc. Int. Conference on Energy and Sustainability, Karachi, Pakistan, January 2013.

#### **Year 2012**

- N. U. Shaikh, M.A. Siddiqui, U. Allauddin, “Integrated solar water-heater and solar water cooler performance during winter time”, NED University J. Research, pp. 61-72, 2012.