Dr Bahamin Bazooyar,

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SUMMARY

I have worked for 12 years as CFD engineer, and I have been involved in 2 mega industry-led projects as lead process engineer supervising and checking work of 13 assigned engineers on the project within budget and schedule, while maintain technical integrity of the designs. I was coordinating and checking process engineering deliverables, holding client review meetings, implementing client comments, and considering its impact on design engineering scope of work as well as man hour cost and budget. I have worked with simulation software such as ANSYS, OpenFOAM, Gasturb, MATLAB, Flare net, Pipe net, Aspen Plus, Aspen Adsorption and HYSYS and I am currently teaching Aspen Plus, HYSYS, and Aspen Adsorption in Cranfield University to design a novel calcium looping process for Tate & Lyle Sugars. I am also a research associate in CFD at ManchesterCFD research Group at Univeristy of Manchester. I have been involved in all stages of EPC projects from supporting proposal/bid work, conceptual, basic, FEED, and detail design. I have developed the basis of design of different refinery or petrochemical units as the Lead Process Engineer, and I have undertaken detailed calculations to develop the design and assure the accuracy of these calculations.

WORK/EDUCATION

Jun. 2021 – Present

CFD Research Associate, ManchesterCFD Team, University of Manchester, UK

- Co-supervision of research students and teaching part-time.
- Conducting CFD R&D activities including consultancy and training for various sectors but mainly focusing in energy, combustion, heat transfer and multi-phase flow.
- Developing research proposals in collaboration with industrial partners for innovateuk and EPSRC.

Nov. 2021 – Present

Research Fellow at Cranfield University, Cranfield, UK

Leading project on derabonisation of Tate & Lyle sugars using novel calcium looping process, including:

- Build and validate process models of the carbonate looping cycles for carbon dioxide removal from Tate & Lyle Sugars (TLS) refinery plant.
- Develop a detailed process model for decarbonisation of Tate & Lyle sugar gigantic boilers using various scenarios of coupling and decoupling for carbonator and calciner using Aspen PLUS.
- Use the developed models to explore the technical feasibility and efficiency of a series of scenarios.
- Obtain and inform the detailed engineering design specifications. Find the sensitivity of the designed process to different operational and economic variables.
- Identify the effect of uncertainty on process thermodynamic and economics.

Contribution to M-level teaching and PhD level supervision:

- Supervision of MSc students (2), group projects, contributing to supervision of PhD students (1).
- Delivering lectures for reactor design, heat transfer, and unit operation modules

Administrative responsibilities:

- The admin for centre webpage update.

Key achievements:

- Publishing a research paper for investigating the coupled and decoupled calcium looping process on decarbonisation. I will also submit a paper to Applied energy which analyses different scenarios for decarbonisation of Tate and Lyle Sugars refinery, and I have received the reviewers' comments which are minor. I have also submitted a paper about technoeconomy of the designed process under different operating scenarios.
- Obtained Recognised Teacher Status.
- Obtained Associate Fellowship of the Higher Education Academy (AFHEA)

March. 2019– Present

P/T Lecturer at Staffordshire University, Stoke-On-Trent, UK

Leading Modules on design of Aircraft Propulsion System, Design Project for Sustainability, including:

- Train UK soldiers serving in North Atlantic Treaty Organisation in Air-engine design and operations.
- Train Staffordshire University Level 4 student in sustainability analysis of any new design and inventions, team working and report preparations.

Tutoring Modules on Modern Power Plants, Power Plants and Clean Technology, Fundamentals Mechanics and Thermofluid, Low Carbon and Renewable Energy Systems and Power and Propulsion Systems, including:

- Lecture level 4-7 students the concepts of novel renewable energy systems, material properties, first, second law of thermodynamics, cycles, and modern power stations.
- Teach the use and practical application of the renewable systems including wind turbine, solar panels and fuel cells.
- Teach the process engineering and design of modern power plants using Aspen Plus software.
- Teach the Gasturb software to simulate the operation of different jet engine and find their operating graphs.

Contribution to Research, development, smart grid and incubation:

- Do a comprehensive feasibility study for pyrolysis of plastic and polymers.

Contribution to M-level teaching and PhD level supervision:

- Supervision of MSc students (14), group projects, contributing to supervision of PhD students (1).

Administrative responsibilities:

- The admin for SAMPID project.

Proposal and research grant preparation:

- EPSRC proposal preparation "**Hy**drogen as a Fuel in Micropower Turbines: **P**otential, **D**esign, and **O**ptimisation (**HYPDO**)"
- EPSRC proposal preparation "**W**aste to **L**ow carbon and highly efficient **Co**generation of heat and **P**ower for domestic applications (**WLCoP**)"
- Innovate UK proposal preparation "**O**ptimised **R**apid **PH**ase-change **E**ngin**E** (ORPHÉE)"

June. 2018 – March 2019

Research Fellow at Staffordshire University, Stoke-On-Trent, UK

Leading project on design of a microturbine renewable energy combustor, including:

- Design and test of an advanced 12 kWe micro-turbine combustor for renewable biogas fuel. The test rig for experiment of the microturbine combustor was assembled. The combustor was manufactured and tested in terms of aerodynamics and level of emissions. The CFD model was exploited to provide the initial design and dimension of the combustor.
- Simulation of the turbulent combustion in the designed microturbine combustor using LES RANS turbulence modelling. The Laminar Flamelet models was used to model the concentration of gaseous species. The formation of NO_X emission was used using a transport equation for NO and was interacted using
- Calculation of the combustor performance in operating conditions of the microturbine, calculation of the emissions and combustion efficiency and pressure drop.
- Simulation of unsteady turbulent combustion in the designed combustor to observe the temporal characteristics of the flame.
- Combustor optimisation in the microturbine condition and obtain the best operating points in the microturbine available plenum.

Key achievements:

- Dissemination of the ideas in both the design and operation of microturbine using renewable/alternative fuels (e.g., Hydrogen, syngas, bio Hythane).
- Published two high ranked journal articles in Conversion Energy Management and FUEL and present the results to ASME Turbo Expo 2019: Turbomachinery Technical Conference and Exposition and EMGTF conference.

Publication:

- **B. Bazooyar**, H. G. Darabkhani. The design strategy and testing of an efficient microgas turbine combustor for biogas fuel. FUEL (2021), 120535.
- **B. Bazooyar**, H. G. Darabkhani. Design, Manufacture and Test of a Micro-turbine Renewable Energy Combustor. Energy Conversion and Management (2020), 112782.

Conference presentation:

- **B. Bazooyar**, H. G. Darabkhani (speaker). The Micro Turbine Renewable Energy Combustor (MiTREC): Challenges in Design and Modelling of a Biogas Combustor in a 12kWe Micro Turbine Generator (MTG). 2nd EMGTF November 26-27, 2018, Madrid, Spain.

- **B. Bazooyar** (speaker), H. G. Darabkhani. Design Procedure and Performance Analysis of a Microturbine Combustor Working on Biogas for Power Generation. Proceedings of ASME Turbo Expo 2019: Turbomachinery Technical Conference and Exposition GT2019 June 17-21, 2019, Phoenix, Arizona, USA.

Sep 2017 to June 2018

P/T Lecturer (Hrly) at Chemical and Petroleum Engineering in Petroleum University of Technology, Ahvaz, Iran

Leading Modules on combustion, heat transmission, advanced measurement techniques and C++ programming

- Train students in practical learning in heat transmission laboratory.
- Doing module tutorials in material and energy balance.

Student Supervision

- Train students in practical learning in heat transmission laboratory.

Sept. 2012 – Oct. 2017

PhD in Chemical Engineering, Iran University of Science and Technology, Iran *(Summa Cum Laude; GPA: 19.28 from 20)*

PhD thesis: Experimental evaluation and CFD simulation of the nitrogen monoxide production in methyl ester (biodiesel) combustion

Research area:

- Building a test rig for biodiesel production using various vegetable oil
- A systematic investigation on suitable operating condition for production of methyl ester using alcohol in an alkali environment.
- Production of biodiesel at the optimum operating points using alkali-based transesterification, water washing and oven dehydration.
- Testing and characterisation of various methyl esters using ASTM standards.
- Combustion testing and Measurement of pollutant including $NO+NO_2$ of biodiesel and diesel fuel in a semi-industrial boiler and make a comparative study for different fuels
- Developing a detailed CFD model for simulation of the combustion in the studied boiler using various combination of turbulence+turbulence/chemistry interaction models
- Validation of the developed models against experimentation using the gleaned data from the first round of project
- Synthesise and characterisation of fuel born catalyst to reduce the level of nitrogen oxides during the combustion of biodiesel
- Analyse the experimental data obtained from the first round of simulation to obtain the level of thermal and prompt NO and make a comprehensive comparison between the NO emission of biodiesel and diesel fuel.

Student supervision:

- supervision of undergraduate students (5)

Key achievements:

- Published 5 articles in 3*/4* journals

Publications:

B. Bazooyar, E Ebrahimzadeh, A Jomekian, A Shariati. NOX Formation of Biodiesel in Utility Power Plant Boilers. Part A: Influence of Fuel Characteristics. Energy & Fuels (2014), 3778- 3792.

B. Bazooyar, A. Shariati, S.H. Hashemabadi. Characterization and Reduction of NO during the Combustion of Biodiesel in a Semi-industrial Boiler. Energy & Fuels (2015), 6804-6814.

B. Bazooyar, S.H. Hashemabadi, A. Shariati. NOX formation of biodiesel in utility power plant boilers ; Part B. Comparison of NO between biodiesel and petrodiesel. Fuel (2016), 323-332.

B. Bazooyar, A. Shariati, S.H. Hashemabadi. Turbulent Non-premixed Combustion of Rapeseed Methyl Ester in a Free Shear Swirl Air Flow. Industrial & Engineering Chemistry Research (2016), 11645-11663.

B. Bazooyar, A. Jomekian, A. Shariati. Analysis of the Formation and Interaction of Nitrogen Oxides in a Rapeseed Methyl Ester Nonpremixed Turbulent Flame. Energy & Fuels (2017), 8708-8721.

Sept. 2008 – Feb. 2011 **MSc in in Chemical Engineering, Petroleum University of Technology, Iran *(Summa Cum Laude; GPA: 18.17 from 20)***

MSc dissertation: Combustion performance and emission of biodiesel using various vegetable oils in a semi-industrial boiler

Key achievements:

- Ranked 1nd in Chemical Engineering Department of Petroleum University of Technology.
- Published 4 article in 2 journals

Publication:

B. Bazooyar, A. Ghorbani, A. Shariati. Combustion performance and emissions of petrodiesel and biodiesels based on various vegetable oils in a semi-industrial boiler. FUEL (2011), 3078-3092.

B. Bazooyar, A. Shariati. A comparison of the emission and thermal capacity of methyl ester of corn oil with diesel in an experimental boiler. Energy Sources, Part A (2013), 1618-1628.

B. Bazooyar, N. Hallajbashi, A. Shariati, A. Ghorbani. An investigation of the effect of input air upon combustion performance and emissions of biodiesel and diesel fuel in an experimental boiler. Energy Sources, Part A (2014), 383-392.

B. Bazooyar, A. Ghorbani, A. Shariati. Physical properties of methyl esters made from alkali-based transesterification and conventional diesel fuel. Energy Sources, Part A (2015), 468-476.

Sept. 2004 – Sept. 2008 **BSc in Chemical Engineering, Isfahan University of Technology, Iran *(Summa Cum Laude; GPA: 17.63 from 20)***

BSc thesis: Review of biodiesel production using alkali-based transesterification.

Internship: Isfahan Refinery.

Key achievements: Ranked 1nd in Chemical Engineering Department

Grants and Contracts (Total number=3, Total Amount= £1.46m)

- Agency: The Innovate UK-Energy Catalyst

Role: Research Fellow
Amount: £1.3m

- Agency: National Iranian Oil Company (NIOC)

Role: Project Co-Investigator
Amount: £120,000

- Agency: Abadan Refinary (AR)

Role: Project Co-Investigator
Amount: £40,000

PROFESSIONAL SKILLS

Experimental skills:	Design, construction and building of biofuel production test rigs for various triglyceride-based oils, Design, construction and building of test rig for combustion and carbon capturing from the combustion of biodiesel fuel
Characterization Skills	Scanning Electron Microscopy (SEM), Brunauer–Emmett–Teller (BET), Elemental Analysis (XRD, FTIR), Thermal Analysis (TGA).
Engineering software:	Ansys, OpenFOAM, COMSOL, CANTERA, CHEMKIN, Gasturb,Aspen Plus, Aspen Hysys, Aspen B Jac (HTFS+), Aspen Adsorption (Adsim), HTRI, Flare net, OLGA, PVTsim, Pipesim, PRO II, Pipenet, OpenLCA,
Solid Design Software	SolidWORKs, AutoDESK
Graphic Design Software	Adobe Illustrators, Adobe Photoshop, Corel Draw
Programming	C++, FORTRAN, PHYTON

Language: Persian (native), English (proficient), Arabic (basic)

SELECTED JOURNAL PUBLICATIONS

1. **B. Bazooyar**, H. G. Darabkhani. Analysis of flame stabilization to a thermo-photovoltaic micro-combustor step in turbulent premixed hydrogen flame. FUEL (2019), 115989.
2. **B. Bazooyar**, A. Shariati, M. R. Khosravi Nikou, S. H. Hashemabadi. Numerical Analysis of Nitrogen Oxides in Turbulent Lifted H_2/N_2 Cabra Jet Flame issuing into a Vitiated Coflow. International Journal of Hydrogen Energy (2019), 13932-13952.
3. **B. Bazooyar**, A. Jomekian, E. Karimi-Sibaki, M. Habibi, H. G. Darabkhani. The Role of Heat Recirculation and Flame Stabilization in the Formation of NO_X in a Thermo-Photovoltaic Micro-Combustor Step Wall. International Journal of Hydrogen Energy (2019), 6012-26027.
4. **B. Bazooyar**, F. Shaahmadi, A. Jomekian, H. G. Darabkhani. Modelling of Wax Deposition by Perturbed Hard Sphere Chain Equation of State. Journal of Petroleum Science and Engineering (2020), 106657.
5. **B. Bazooyar**, F. Shaahmadi, A. Jomekian, M.A. Anbaz. Intelligent modelling and analysis of biodiesel/alcohol/glycerol liquid-liquid equilibria. Journal of Molecular Liquids (2021), 114972.

Book

1. **B. Bazooyar.** Carbon Capture Technologies for Gas-Turbine-Based Power Plants. Elsevier. In press. 2022.