



Mohammad Mehdizadeh Youshanlouei

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EDUCATION AND TRAINING

10 SEP 2014 – 16 JUL 2018 Urmia , Iran

BACHELOR'S OF SCIENCE IN MECHANICAL ENGINEERING Urmia University of Technology

Address Band Avenue, 57166-93187, Urmia , Iran | **Website** www.uut.ac.ir | **Final grade** 17.29 / 20 |

Thesis Numerical Simulation of FHD Micropump Using Magnetic Field of Permanent Magnet

23 SEP 2018 – 9 NOV 2020 Urmia , Iran

MASTER'S OF SCIENCE IN MECHANICAL ENGINEERING / ENERGY CONVERSION Urmia University of Technology

Address Band Avenue, 57166-93187, Urmia , Iran | **Website** www.uut.ac.ir | **Final grade** 18.76 / 20 |

Thesis Numerical Study of Magnetic Solar Still

1 NOV 2022 – 31 OCT 2025 Bologna, Italy

PHD IN MECHANICAL AND ADVANCED ENGINEERING SCIENCE Alma Mater Studiorum Università di Bologna

Website <https://www.unibo.it> | **Level in EQF** EQF level 8 |

Thesis Deep Learning Methods for the Analysis of Microfluidic and Acoustofluidic Systems

WORK EXPERIENCE

 **HZDR – DRESDEN, GERMANY**

RESEARCHER – 1 JAN 2021 – 30 MAY 2021

I had a cooperation with Dr. Lucas on OpenFOAM CFD modeling for bubbly flows during the period from January until May 2021. In particular, I was involved in the setup of different test cases for the validation of the baseline model for poly-disperse bubbly flows. (OpenFOAM-dev/HZDRmultiphaseEulerFoam)

LANGUAGE SKILLS

Mother tongue(s): **AZERBAIJANI** | **PERSIAN**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	B2	B2	B2	B2	B2
GERMAN	A1	A1	A1	A1	A1
TURKISH	C1	B1	B2	C1	A1
ITALIAN	B1	B1	B1	B1	B1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

● SKILLS

Operating Systems

Windows | Linux, user level;

Programming Skills

Programming Languages: C, C++, Python, Matlab | Arduino

Other Skills

DEEP LEARNING | SolidWorks | Computational Fluid Dynamics: OpenFOAM, ANSYS Fluent | EES | Gambit

● PROJECTS

Unsupervised Machine Learning for clustering the stages of the 3D cell culturing process under ultrasonic standing waves

3D cell cultures, due to their acceptable similarity to real cancer tumors, received a lot of attention from researchers and scientists. Utilizing the volumetric body force of ultrasound standing waves had outstanding outputs in this regard. Moreover, it also allows us to have high-quality microscopic images of the hole process. Followed by previous works in combination of Machine Learning and microfluidic application, in this work, we decided to use unsupervised Machine Learning to quantify the performance of the Ultrasound device in 3D cell culturing. Clustering of different phases of this process over time was the first task that we attended. The main goal was to find the first time point at which cell culturing is done and the Spheroid is ready to be used in other experiments. In this case, we used ResNet 50 for feature extraction, which is a key step of this process, and we applied K-Means for unsupervised clustering of the images based on the extracted features of the high-quality microscopy images of the wells over time.

1 NOV 2022 – CURRENT

Machine learning methods applied to thermofluidic micro-systems

The aim of this project is to develop and apply Machine Learning methods to provide innovative and superior tools for the characterization of thermofluidic micro-systems. In the first year of this PhD, Deep Neural Networks were used to track and characterize the 3D position and orientation of complex objects flowing in microfluidic systems, such as non-spherical colloids, red blood cells, or unicellular organisms. In particular, Convolutional Neural Networks (CNN) have been implemented and showed acceptable predictions of depth and orientation of an ellipsoid particle on synthetic images (TensorFlow, micro-PIV).

1 DEC 2021 – 1 MAR 2022

Combination of CFD and Machine Learning

CNN is used to predict Wall Heat Flux and the inputs are Wall Pressure and Velocity gradients. (TensorFlow, DNS)

1 JUL 2020 – 1 DEC 2020

Numerically simulated heat transfer inside a corrugated helical tube.

Pure water and Al₂O₃-water were used as working fluid. Thermal, exergy, and economic efficiencies were investigated. (OpenFOAM 2.3.1/buoyantBoussinesqueSimpleFoam)

Link <https://doi.org/10.1016/j.csite.2021.100948>

1 APR 2020 – 1 JUL 2020

Analyzed the cooling performance of six novel shaped solar panel towers

The electrical efficiency of panels was also investigated (OpenFOAM 2.3.1/buoyantBoussinesqueSimpleFoam)

Link <https://doi.org/10.1016/j.csite.2021.101232>

1 OCT 2019 – 1 APR 2020

Numerically simulated the performance of magnetic solar still

Total freshwater yield and thermal performance were investigated. (OpenFOAM 2.3.1/new solver developed)

Link <https://doi.org/10.1007/s11356-021-12947-1>

1 JAN 2020 – 1 MAY 2020

Thermomagnet

Numerically simulated the mixed convection of the magnetic nanofluid in heat exchangers in the presence of a magnetic field using Boungiorno model. Brownian motion, Thermophoresis and Magnetophoresis terms were considered.

(OpenFOAM 2.3.1/new solver developed)

1 OCT 2019 – 1 NOV 2019

Micromachined Thermal Flow Sensor

Analyzed the thermal performance of micromachined thermal flow sensors numerically/analytically.

(Matlab R2015b)

1 JUN 2019 – 1 FEB 2020

Air Water Two Phase Flow Visualization

Numerically and experimentally investigated the performance of non-boiling two-phase flow in a vertical helical tube. The flow visualization and pressure drop of slug flow were studied.

(OpenFOAM 2.3.1/compressibleInterFoam)

Link <https://doi.org/10.1016/j.aej.2021.12.024>

1 JUN 2019 – 1 SEP 2019

Bubble Collapsing

Numerically investigated bubble collapsing near a rigid wall.

(OpenFOAM 2.3.1/ compressibleInterFoam)

1 JAN 2016 – 1 APR 2016

Turbo Pulse Jet Engine

Design a fan and a turbine for model pulse jet engines used in RC airplanes.

(SolidWorks 2017)

1 MAR 2017 – 1 MAR 2018

FHD Micro Pump

Numerically simulated the pumping of magnetic nanofluid inside a microchannel using a magnetic field.

(OpenFOAM 2.3.1/new solver developed)

Link <https://doi.org/10.1007/s40430-019-1734-7>

PUBLICATIONS

2024

[Deep learning and defocus imaging for determination of three-dimensional position and orientation of microscopic objects](#)

2022

[Investigation of thermal performance of a shell and tube latent heat thermal energy storage tank in the presence of different nano-enhanced PCMs](#)

2022

[Experimental investigation on the thermo-hydraulic performance of air-water two-phase flow inside a horizontal circumferentially corrugated tube](#)

2022

[Cooling a central processing unit by installing a mini channel and flowing nanofluid, and investigating economic efficiency](#)

2021

[Thermal, efficiency and power output evaluation of pyramid, hexagonal and conical forms as solar panel](#)

2021

[The effect of magnetic field on the performance improvement of a conventional solar still: a numerical study](#)

2021

[Effect of volume fraction and size of Al₂O₃ nanoparticles in thermal, frictional and economic performance of circumferential corrugated helical tube](#)

2020

[Thermal/Exergy and Economic efficiency analysis of circumferentially corrugated helical tube with constant wall temperature](#)

2019

[investigation of FHD pump for pumping the magnetic nanofluid inside the microchannel](#)

2018

Numerical simulation of FHD micro pump using magnetic field of permanent magnet

In Persian _ Modarres Mechanical Engineering Journal

2020

Magnetic Solar Still

Patent

IR Application No. 139850140003010645, 2020

2017

Turbo Pulse Jet

Patent

IR Application No, 139650140003009502, International Ranking No. F23R 7/00;F23R 3/00, 2017

● **PROFFESIONAL SERVICES**

CURRENT

Technical Paper Reviewer

Reviewed and assessed the quality for publication of technical paper based on my expertise in two-phase non-boiling air-water flows, Solar Desalination, Nanofluids, CFD, Heat Exchanger and Heat and Mass Transfer for Journals like Case Study in Thermal Engineering and Energy Storage

● **HOBBIES AND INTERESTS**

Machine Learning and Deep Learning in Fluid Dynamic

• **Renewable Energy and Solar Desalination**

• **Developing new solvers for OpenFOAM**

• **Thermal Multiphase flow simulation**

● RECOMMENDATIONS

Massimiliano Rossi Associate Professor

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Martin Viklund Professor

Head of Division KTH-Biophysics, KTH Royal Institute of Technology, *Department of Applied Physics*

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Saber Yekani Motlagh Associate Professor

Department of Renewable Energies, Urmia University of Technology

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Dirk Lucas Professor

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Forli 11/11/2025



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