MEHDI MOSHARAF DEHKORDI

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PROFESSIONAL SUMMARY

Passionate Associate Professor of Mechanical Engineering with over 15 years of experience in developing proprietary and industry-standard Computational Fluid Dynamics (CFD) codes. Dedicated to excellence in cutting-edge research published extensively in reputable journals, collaborating with industry partners, and providing captivating instruction for undergraduate and graduate students. Highly Passionate in devising highly efficient numerical algorithms for simulating multi-phase transport in heterogeneous porous media, as a key focus of my forthcoming research endeavors.

Research interests

⋆ Multiphase Transport in Porous Media ⋆ Hydrocarbon Reservoir Simulation ⋆ Multiscale Methods

EXPERIENCE

Jan. 2022 – Present.	Associate Professor of Mechanical Engineering, University of Isfahan, Isfahan, Iran.
Jan. 2015 – Jan. 2022.	Assistant Professor of Mechanical Engineering, University of Isfahan, Isfahan, Iran.
Oct. 2021 – Apr. 2023.	Vice Dean for Education, Department of Mechanical Engineering, University of Isfahan, Isfahan, Iran

SELECTED INDUSTRIAL EXPERIENCE

2008 – 2015. Hydrocarbon Reservoir Simulator Development (the FARS-II project):

- National Iranian South Oil Company, Ahwaz, Iran.
- Principal Investigator and Software Developer
- Key Achievements:
  - ⋆ Spearheaded the development of an advanced Reservoir Simulator in C++ (object-oriented).
  - ⋆ A Naturally Fractured Reservoir Simulator based on the black-oil (simplified compositional) formulation.
  - ⋆ Implemented a Finite Volume Approach on 3D Fully Unstructured Grids
  - ⋆ Led and coordinated a team of software developers ensuring project success

EDUCATION

Sep., 2008 – Aug., 2013. PhD., Mechanical Engineering
Sharif University of Technology, Tehran, Iran,
Dissertation: Multi-resolution Multiscale Finite Volume Method for Hydrocarbon Reservoir Simulation

Sep., 2005 – Oct., 2007. M.Sc., Mechanical engineering - energy conversion
Sharif University of Technology, Tehran, Iran,
Thesis: Numerical Simulation of Cavitation in Water-Hammer

Sep., 2001– Sep., 2005. B.Sc., Mechanical engineering - design of solids
K. N. Toosi University of Technology, Tehran, Iran,

TECHNICAL SKILLS

- **Computer Programming:** C/C++ (Proficient), MATLAB (Proficient), Python (intermediate).
- **CFD and Engineering Software:**
  - ⋆ COMSOL (Proficient, 2014 – Present)
  - ⋆ Ansys Fluent (Intermediate, 2012 – Present)
  - ⋆ Solid works and Catia (Intermediate, 2005 – 2018)
- **Reservoir simulation Software**
  - ⋆ Eclipse (Intermediate, 2008 – Present)
  - ⋆ MRST (Intermediate, 2015 – 2018)
  - ⋆ CMG (Beginner, 2008 – 2015)

AWARDS AND HONORS

- Outstanding Student Award, Department of Mechanical Engineering, K. N. Toosi University of Technology (2004).
- Scholarship, National Iranian Oil refining & Distribution Company (2005-2007).
- Outstanding educator award, University of Isfahan (2018).

COURSES TAUGHT (selected graduate and undergraduate courses)

- ⋆ Transport phenomena in Porous Media (Annual, 2015-present)
- ⋆ Heat conduction (Annual, 2015-present)
- ⋆ Computational Fluid Dynamics (CFD) (2016-2017)
- ⋆ Thermodynamics (Annual, winter 2015-present)
- ⋆ Engineering Mathematics (Annual, 2015-present)
- ⋆ Fluid Mechanics (2016-2017)

SELECTED REFEREED PUBLICATIONS (GOOGLE SCHOLAR LINK)

[1] S. S. Fakhradini, M. Mosharaf-Dehkordi, H. Ahmadikia. "Improved liver cancer hyperthermia treatment and optimized microwave antenna power with magnetic nanoparticles". Heat Mass Transf., 2024, 1-16.

[2] M. Azizi, M. Mosharaf-Dehkordi, N. Fouladi, C. Kazanci "An enhanced hybrid model for batch sugar crystallization based on the pattern recognition for overall heat transfer coefficient using a machine learning approach". J. Food Process Eng., 2024, 47(4), e14614.

[3] S. S. Fakhradini, M. Mosharaf-Dehkordi, H. Ahmadikia. "Enhancing liver cancer treatment: Exploring the frequency effects of magnetic nanoparticles for heat-based tumor therapy with microwaves", Int. J. Thermal Sci., 2024, 203, 109154.

[4] N. Jafari Ghahfarrokhi, M. Mosharaf-Dehkordi, M. Bayareh. "Experimental and numerical assessment and performance optimization of a novel T-arrow microfluidic device to mix two fluids with different thermophysical properties", Chem. Eng. Process. -Process Intensif., 2024, 201, 109808.

[5] B. Partovi, H. Ahmadikia, and M. Mosharaf-Dehkordi. "Analytical and numerical analysis of the dual-phase lag heat transfer in a three-dimensional tissue subjected to a moving multi-point laser beam", J. Thermal Biol., 2023, 112: 103431.

[6] M. Mosharaf-Dehkordi, "A fixed-point multi-scale finite volume method: Application to two-phase incompressible fluid flow through highly heterogeneous porous media", J. Comput. Phys., 2022, 462 (1): 111219.

[7] M. Jamei, M. Mosharaf-Dehkordi, and H. R. Ghafouri. "A Sequentially-Hybridized Locally Conservative Non-Conforming Finite Element Scheme for Two-phase Flow Simulation through Heterogeneous Porous Media", Adv. Water Resour., 2022, 162:104155.

[8] F. Mazlumi, M. Mosharaf-Dehkordi, M. Dejam, "Simulation of two-phase incompressible fluid flow in highly heterogeneous porous media by considering localization assumption in multiscale finite volume method", Appl. Math. Comput., 2021, 390 (1): 125649.

[9] S. Hayati, M. Mosharaf-Dehkordi, M. Ziaee-Rad, M. Dejam, "A three-dimensional coupled well-reservoir flow model for determination of horizontal well characteristics", J. Hydrol., 2020:124805.

[10] R. Ahmadi-Badejani, M. Mosharaf-Dehkordi, and H. Ahmadikia, "An image-based geometric model for numerical simulation of blood perfusion within the liver lobules", Comput. Methods Biomech. Biomed. Eng., 2020, 1-18.

[11] M. Mosharaf-Dehkordi, "A fully coupled porous media and channels flow approach for simulation of blood and bile flow through the liver lobules", Comput. Methods Biomech. Biomed. Eng., 2019, 22 (9): 901-915.

[12] M. Mosharaf-Dehkordi and H. R. Ghafouri, "A Numerical Algorithm for Group Control of Conventional/ Unconventional Production Wells in Hydrocarbon Reservoirs", Int. J. Numer. Methods Heat Fluid Flow., 2018, 28(11): 2506-2530.

[13] E. Afshari, M. Mosharaf-Dehkordi, and H. Rajabian, "An investigation of the PEM fuel cells performance with partially restricted cathode flow channels and metal foam as a flow distributor", Energy, 2017, 118 (1):705-715.

[14] M. Mosharaf-Dehkordi, M. T. Manzari, H. Ghafouri, and R. Fatehi, "A General Finite Volume Based Numerical Algorithm for Hydrocarbon Reservoir Simulation Using Blackoil Model", Int. J. Numer. Methods Heat Fluid Flow., 2014, 24 (8):1831-1863.

[15] M. Mosharaf-Dehkordi and M. T. Manzari, "Effects of using Altered Coarse Grids on the Implementation and Computational Cost of the Multiscale Finite Volume Method", Adv. Water Resour., 2013, 59 (1):221-237.

[16] M. Mosharaf-Dehkordi and M. T. Manzari, "A Multi-resolution Multiscale Finite Volume method for Simulation of Fluid Flows in Heterogeneous Porous Media", J. Comput. Phys., 2013, 248 (1):339-362.

SELECTED CONFERENCE PROCEEDINGS

[1] N. Jafari Ghahfarokhi, M. Mosharaf-Dehkordi, "Micromixing of deionized water and plasma using square-wave microchannels Auteurs", 3rd International Conference on Innovative Academic Studies, 26th -28th Sep., 2023, Konya, Turkey.

[2] F. Mazlumi, M. Mosharaf-Dehkordi, "Study of localization assumption in multi-scale finite volume method for simulation of hydrocarbon reservoirs", The 9th National Conference on CFD Applications in Chemical & Petroleum Industries, 21st Nov. 2018, Tehran University, Tehran, Iran (In Persian).

[3] M. Mosharaf-Dehkordi, M. M. Gorji, "Development of a simulation-optimization model for improving the drilling location and performance conditions of injection and production wells in hydrocarbon reservoirs", 21st Nov. 2018, Tehran University, Tehran, Iran (In Persian).

[4] M. Mosharaf-Dehkordi, B. Afzalan, "Simple and practical tricks to increase the stability of the IMPES method in simulating fractured hydrocarbon reservoirs", 25th Annual International Conference of Iranian Society of Mechanical Engineering, 2nd-4th May 2017, Tarbiat Modarres University, Tehran, Iran (In Persian).

[5] M. Mosharaf-Dehkordi, "The absolute permeability of the porous medium as an influential factor in increasing the localization error of the volume finite volume method", The 6th National Conference on CFD Applications in Chemical & Petroleum Industries, 27th May 2015, Isfahan University of Technology, Isfahan, Iran (In Persian).