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EDUCATION

- Doctor of Philosophy**, Energy Conversion 2008-2012
School of Mechanical Engineering, University of Tehran, Tehran, Iran
Thesis: Thermal enhanced oil recovery modeling in oil reservoir using streamline simulation
Supervisors: Prof. Peyman Pourafshary, Prof. Mehrdad Raisee Dehkordi
- Master of Science**, Energy Conversion 2006-2008
School of Mechanical Engineering, University of Tehran, Tehran, Iran
- Bachelor of Science**, Mechanical Engineering 2006-2008
School of Mechanical Engineering, University of Tehran, Tehran, Iran

HONORS AND AWARDS

- Outstanding young researcher award, Iran Academy of Science** 2021
This award is highly prestigious and is given to young professors (below 40 years old), having outstanding research, teaching, and industrial experiences. In each year, only one young elite scientist in each field of engineering will be nominated for this award.
- Excellent researcher award, Iran University of Science and Technology** 2019-2022
This award is given to the faculty of each school having the best research record in each year. I received this award four times in the last 4 years from the head of Iran University of Science and Technology.
- Top 1% scientist, ESI report** 2021-2023
Since 2021 I'm present in the list of top 1% highly cited scientists based on ESI report.
- Top 2% scientist, Stanford University Scientific Ranking** 2020-2023
Since 2020 I'm present in the list of top 2% scientists based on Scopus data.
- Khwarizmi International Award, Iran research organization for science and technology (IROST)** 2004
During my BSc study, I had participated in a team project for design and construction of the first solar car in Iran and the middle east and received this award from the president of Iran.
- Appreciation as Excellent Teacher, Iran University of Science and Technology** 2015
From the view of outstanding students, I had been selected as an excellent teacher of the school due to my activities in presenting courses.
- Best master thesis award, Iranian Society of Mechanical Engineers (ISME)** 2021
I supervised this thesis entitled "Experimental and numerical analysis of parabolic trough solar collector with rotating absorber tube".

RESEARCH EXPERIENCES

- Academic Visitor, Imperial College London (PI: Professor Martin J Blunt)** 2011-2012
As a part of my PhD thesis, I worked as a visitor and developed a three-dimensional two-phase reservoir simulation code to resolve hot waterflooding in heterogeneous reservoirs to enhance oil recovery. Two papers are published from this project. Also, the developed code is available online on the Imperial College London website.

**Faculty (Associate Professor), School of Mechanical Engineering,
Iran University of Science and Technology (IUST)**

2013-Now

Immediately after gaining my PhD, I started my work in IUST. In about 10 years, I have supervised more than 65 master theses, and about 10 PhD theses. In addition, from these research works, more than 90 scientific papers are published in international journals.

Institute of Enhanced Oil Recovery, Iran University of Science and Technology

2021-Now

We are working on EOR projects and developing new numerical codes with applications in petroleum industry. I conducted a project for national Iranian oil company (NIOC) and streamline simulation was performed on an Iranian oil field to account well-allocation factors, injection efficiencies, well connections, and trapped oil.

National Elites Foundation Grant

2021-2022

The grant awarded for design and development of a reservoir surveillance software based on streamline flood efficiency maps. A team of 12 amateur students, including PhD, MSc and BSc students are managed and conducted to learn how to design a software and write numerical codes. Finally, a software was developed that can link with FrontSim and export streamline data in a user-friendly environment to perform reservoir surveillance.

RESEARCH INTERESTS

Reservoir simulation

Transport in porous media

Computational fluid dynamics (CFD)

Heat transfer

CURRENT PROJECTS

Streamline simulation of multiphase flow in porous media

2012 – Now

A three-dimensional reservoir simulator is developed, as my PhD thesis. The developed code is open source and is now available on the Imperial College website. Various theses and an industrial project are defined on this basis and the research outcomes are currently published in international journals.

Pore-scale transport in porous media

2017 – Now

Pore-scale simulation of transport in porous media can be used to predict the large-scale properties of porous structures. We have focused on numerical techniques to simulate transport in porous media. We are developing two main open-source codes based on finite volume method (FVM) and lattice Boltzmann method (LBM). Now about 10 master and PhD students are actively working on this project. Also, we are collaborating with some distinguished researchers in Imperial College London and The University of Warwick.

Enhanced oil recovery

2013 – Now

Numerical simulation is used as an accurate tool for visualization of flow through reservoirs. Rate optimization and optimal well-placement can substantially improve the oil recovery. New numerical algorithms and optimization strategies are developed to speed up the flow simulation and decision-making process. One PhD thesis and 4 master theses have been done on this topic and the outcomes are published in international journals.

Enhanced heat transfer

2013 – Now

Various academic numerical solvers are developed to be implemented for numerical simulation of enhanced heat transfer in different engineering applications, such as hydrogen generation, heat exchangers, heat sinks, solar collectors, and more. Use of porous metal foams, use of nanofluids, and application of extended surfaces are among the applied enhanced heat transfer methods. About 10 master and PhD students are currently working on this project and the results are published in international journals.

Different projects are defined to absorb and store the solar energy and convert that into desired forms of energy. Design and construction of a parabolic trough solar collector, design of thermal energy storage units with phase change materials, investigation of adsorption cooling systems working with activated carbon as the adsorbent are some of current projects. Two PhD students and 5 master students have been worked on these projects.

TEACHING

Reservoir simulation

Introduction to oil and gas industry

Computational fluid dynamics (CFD)

Advanced numerical methods

Fluid mechanics I, II

Advanced engineering mathematics

Heat transfer

PUBLICATIONS

Selected papers on reservoir simulation and pore-scale simulation

[1] Siavashi M, Pourafshary P, Raisee M. Application of space-time conservation element and solution element method in streamline simulation. *Journal of Petroleum Science and Engineering* 2012;96–97:58–67.

<https://doi.org/10.1016/j.petrol.2012.08.005>.

[2] Siavashi M, Blunt MJ, Raisee M, Pourafshary P. Three-dimensional streamline-based simulation of non-isothermal two-phase flow in heterogeneous porous media. *Computers & Fluids* 2014;103:116–31.

<https://doi.org/10.1016/j.compfluid.2014.07.014>.

[3] Choobineh MJ, Siavashi M, Nakhaee A. Optimization of oil production in water injection process using ABC and SQP algorithms employing streamline simulation technique. *Modares Mechanical Engineering* 2015;15:227–38.

[4] Ahmadpour M, Siavashi M, Doranehgard MH. Numerical simulation of two-phase flow in fractured porous media using streamline simulation and IMPES methods and comparing results with a commercial software. *Journal of Central South University* 2016;23:2630–7. <https://doi.org/10.1007/s11771-016-3324-5>.

[5] Siavashi M, Garusi H, Derakhshan S. Entropy generation analysis and optimization of steam injection temperature and well rates to enhance oil recovery from oil reservoirs in steam assisted gravity drainage process (SAGD). *Modares Mechanical Engineering* 2016;16:393–404.

[6] Siavashi M, Tehrani MR, Nakhaee A. Efficient Particle Swarm Optimization of Well Placement to Enhance Oil Recovery Using a Novel Streamline-Based Objective Function. *J Energy Resour Technol* 2016;138:052903–052903. <https://doi.org/10.1115/1.4032547>.

[7] Siavashi M, Doranehgard MH. Particle swarm optimization of thermal enhanced oil recovery from oilfields with temperature control. *Applied Thermal Engineering* 2017;123:658–69.

<https://doi.org/10.1016/j.applthermaleng.2017.05.109>.

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<https://doi.org/10.1080/10407782.2017.1400330>.

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- [11] Mesbah M, Vatani A, Siavashi M. Streamline simulation of water-oil displacement in a heterogeneous fractured reservoir using different transfer functions. *Oil & Gas Science and Technology - Rev IFP Energies Nouvelles* 2018;73:14. <https://doi.org/10.2516/ogst/2018004>.
- [12] Siavashi M, Yazdani M. A Comparative Study of Genetic and Particle Swarm Optimization Algorithms and Their Hybrid Method in Water Flooding Optimization. *J Energy Resour Technol* 2018;140:102903–102903–10. <https://doi.org/10.1115/1.4040059>.
- [13] Baghernezhad D, Siavashi M, Nakhaee A. Optimal scenario design of steam-assisted gravity drainage to enhance oil recovery with temperature and rate control. *Energy* 2019;166:610–23. <https://doi.org/10.1016/j.energy.2018.10.104>.
- [14] Mesbah M, Vatani A, Siavashi M, Doranehgard MH. Parallel processing of numerical simulation of two-phase flow in fractured reservoirs considering the effect of natural flow barriers using the streamline simulation method. *International Journal of Heat and Mass Transfer* 2019;131:574–83. <https://doi.org/10.1016/j.ijheatmasstransfer.2018.11.097>.
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- [16] Norouzi AM, Siavashi M, Etebari A, Khaliji Oskouei M. Experimental estimation of axial–vertical flow permeability through a packed bed of granular activated carbon. *J Therm Anal Calorim* 2020;141:1493–508. <https://doi.org/10.1007/s10973-020-09918-y>.
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- [18] Poureslami P, Siavashi M, Moghimi H, Hosseini M. Pore-scale convection-conduction heat transfer and fluid flow in open-cell metal foams: A three-dimensional multiple-relaxation time lattice Boltzmann (MRT-LBM) solution. *International Communications in Heat and Mass Transfer* 2021;126:105465. <https://doi.org/10.1016/j.icheatmasstransfer.2021.105465>.
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- [20] Ramezanpour M, Siavashi M, Raeini AQ, Blunt MJ. Pore-scale simulation of nanoparticle transport and deposition in a microchannel using a Lagrangian approach. *Journal of Molecular Liquids* 2022;355:118948. <https://doi.org/10.1016/j.molliq.2022.118948>.
- [21] Sepehri E, Siavashi M. Pore-scale direct numerical simulation of fluid dynamics, conduction and convection heat transfer in open-cell Voronoi porous foams. *International Communications in Heat and Mass Transfer* 2022;137:106274. <https://doi.org/10.1016/j.icheatmasstransfer.2022.106274>.
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- [23] Hosseini M, Siavashi M, Shirbani M, Mousavi Nezhad M. Reliability assessment of the Lattice-Boltzmann Method for modeling and quantification of hydrological attributes of porous media from microtomography images. *Advances in Water Resources* 2023;171:104351. <https://doi.org/10.1016/j.advwatres.2022.104351>.

- [24] Khoshtarash H, Siavashi M, Ramezanpour M, Blunt MJ. Pore-scale analysis of two-phase nanofluid flow and heat transfer in open-cell metal foams considering Brownian motion. *Applied Thermal Engineering* 2023;221:119847. <https://doi.org/10.1016/j.applthermaleng.2022.119847>.
- [25] Paknahad R, Siavashi M, Hosseini M. Pore-scale fluid flow and conjugate heat transfer study in high porosity Voronoi metal foams using multi-relaxation-time regularized lattice Boltzmann (MRT-RLB) method. *International Communications in Heat and Mass Transfer* 2023;141:106607. <https://doi.org/10.1016/j.icheatmasstransfer.2022.106607>.

Other Journal papers

- [26] Shirbani M, Siavashi M, Bidabadi M. Phase Change Materials Energy Storage Enhancement Schemes and Implementing the Lattice Boltzmann Method for Simulations: A Review. *Energies* 2023;16:1059. <https://doi.org/10.3390/en16031059>.
- [27] Mousavi S, Zadehkabir A, Siavashi M, Yang X. An improved hybrid thermal management system for prismatic Li-ion batteries integrated with mini-channel and phase change materials. *Applied Energy* 2023;334:120643. <https://doi.org/10.1016/j.apenergy.2023.120643>.
- [28] Variji N, Siavashi M, Tahmasbi M, Bidabadi M. Analysis of the effects of porous media parameters and inclination angle on the thermal storage and efficiency improvement of a photovoltaic-phase change material system. *Journal of Energy Storage* 2022;50:104690. <https://doi.org/10.1016/j.est.2022.104690>.
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- [30] Shirbani M, Siavashi M, Hosseini M, Bidabadi M. Improved thermal energy storage with metal foam enhanced phase change materials considering various pore arrangements: A pore-scale parallel lattice Boltzmann solution. *Journal of Energy Storage* 2022;52:104744. <https://doi.org/10.1016/j.est.2022.104744>.
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- [36] Chahardoli S, Khakzand M, Faizi M, Siavashi M. Numerical analysis of the effect of roof types and porch on particle dispersion and deposition around a low-rise building. *Journal of Building Engineering* 2022;53:104533. <https://doi.org/10.1016/j.jobbe.2022.104533>.
- [37] Baadj S, Mir H, Abderrahmane A, Siavashi M, Moria H, Mohammed S, et al. Three-dimensional numerical investigation of MHD nanofluid convective heat transfer inside a cubic porous container with corrugated bottom wall. *Journal of Porous Media* 2022;25:59–78. <https://doi.org/10.1615/JPorMedia.2022041002>.

- [38] Aryan Y, Jannat Alipour M, Siavashi M, Norouzi AM. Heat transfer augmentation of a PTC with rotating absorber, utilizing nanofluid and porous lines. *Sustainable Energy Technologies and Assessments* 2022;52:102229. <https://doi.org/10.1016/j.seta.2022.102229>.
- [39] Aryan H, Beigzadeh B, Siavashi M. Euler-Lagrange numerical simulation of improved magnetic drug delivery in a three-dimensional CT-based carotid artery bifurcation. *Computer Methods and Programs in Biomedicine* 2022;219:106778. <https://doi.org/10.1016/j.cmpb.2022.106778>.
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- [42] Siavashi M, Vahabzadeh Bozorg M, Toosi MH. A numerical analysis of the effects of nanofluid and porous media utilization on the performance of parabolic trough solar collectors. *Sustainable Energy Technologies and Assessments* 2021;45:101179. <https://doi.org/10.1016/j.seta.2021.101179>.
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EDITORIAL EXPERIENCES

Editorial Board, Journal of Central South University, Springer Nature	2020-Now
Section Editor, Frontiers in energy research, Frontiers	2021-Now
Guest Editor, Sustainable Energy Technologies and Assessments, Elsevier <i>Special issue on “Porous materials for sustainable energy technologies”.</i>	2021-2022
Guest Editor, Applied Thermal Engineering, Elsevier <i>Special issue on “Recent Advances in Thermal Transport in Porous Media for Engineering Applications”.</i>	2020-2021
Guest Editor, Journal of Thermal Analysis and Calorimetry, Springer Nature <i>Special issue on “Recent Advances in Transport in Porous Media”.</i>	2020-2021
Guest Editor, Journal of Central South University, Springer Nature <i>Special issue on “Energy and sustainable development”.</i>	2022-Now

Guest Editor, Journal of Central South University, Springer Nature <i>Special issue on "Recent advances in enhanced heat transfer".</i>	2019-2020
Guest Editor, Journal of Central South University, Springer Nature <i>Special issue on "Nanofluids".</i>	2018-2019
Guest Editor, Journal of Porous Media, Begellhouse <i>Special issue on "Porous materials for sustainable energy technologies".</i>	2021-2022
Guest Editor, Special Topics and Reviews in Porous Media, Begellhouse <i>Special issue on "Porous materials for sustainable energy technologies".</i>	2022-2023

ADMINISTRATIVE EXPERIENCES

Head of Department Department of Energy Conversion, School of Mechanical Engineering, Iran University of Science and Technology	2022-Now
Deputy of Education and Graduate Studies School of Mechanical Engineering, Iran University of Science and Technology	2018-2022
Vice President Institute of Enhanced Oil Recovery, Iran University of Science and Technology	2021-Now