JASSEM ABBASI

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ABOUT ME

A researcher with experience in working close with university and industry, professional in numerical analysis of physical processes, especially flow in porous media and three years of research in the field of Scientific Machine Learning, and Deep Learning.

QUALIFICATIONS

Programming
Reservoir Engineering/Simulation
Scientific Machine Learning / Deep Learning
Computational Fluid Dynamics (CFD)
Numerical/Analytical Simulation
Flow in Porous Media | Thermodynamics
Data Analytics
Cloud/GPU Computing

SKILLS

ECLIPSE, CMG, MRST (...)
COMSOL, OpenFoam
Petrel
PVTi, PVTsim (...)
PipeSim (...)

Python, C#, MATLAB
TensorFlow, PyTorch
Sklearn, SciPy, (...)
PyTorch Geometric
Git (Version Control)
Azure ML
Databases (MySQL)
GPU Computing
OOP (Object Oriented Programming)
PowerBI

WP Web Development
Adobe Photoshop
Digital Marketing

LANGUAGES

English Fluent
Norwegian Elementary
Persian Native

CURRENT ACTIVITY

Application of Physics-Informed Neural Networks in Core-Scale Simulation of Flow in Porous Media

We are focused on the Physics-Informed Neural Networks based analysis (forward and inverse) of flow in porous media at core scale processes, in specific 3D simulation of two-phase flow (CO_2 flooding) in multi-scale fractured cores.

EXPERIENCES (selected)

EQUINOR ASA, Norway (2022)
Subsurface Geoscience/Reservoir Simulation Engineer (Summer Intern)

ZODAN SOLUTIONS LTD., UK (2019-2020)
Scientific Software Developer

SHIRAZ UNIVERSITY/PETROAZMA OIL COMPANY, Iran (2016-2018)
Reservoir [Simulation] Engineer/Researcher

PETROTIRAZIS OIL COMPANY PTED., Iran (2016)
Scientific Software Developer (Intern)

EDUCATION

UNIVERSITY OF STAVANGER (2021- Oct. 2024)
Petroleum Technology – Scientific Machine Learning (PhD)

SHIRAZ UNIVERSITY (2014-2016)
Reservoir Engineering (M.Sc.)

PETROLEUM UNIVERSITY OF TECHNOLOGY (2010-2014)
Reservoir Engineering (B.Sc.)

PUBLICATIONS (selected)

ICLR Conference - submitted (2024): Simulation of Multi-Phase Flow in Fractured Porous Media Using Physics-Informed Neural Networks

SPE Journal (2024): Application of Physics-Informed Neural Networks for Estimation of Saturation Functions from Countercurrent Spontaneous Imbibition Tests

Energy and Fuels (2023): Simulation and Prediction of Spontaneous Imbibition at Early and Late Times Using Physics-Informed Neural Networks

ArXiv Preprint (2023): Physical Activation Functions (PAFs): An Approach for More Efficient Induction of Physics into Physics-Informed Neural Networks (PINNs)

SPE Europec (2022): Improved Initialization of Non-linear Solvers in Numerical Simulation of Flow in Porous Media with a Real-time Deep Learning Approach

Petroleum Science (2021): On the Impact of Solutal Marangoni Convection during Chemical Flooding for Improved Oil Recovery

Journal of Petroleum Science and Engineering (2018): A new numerical approach for investigation of the effects of dynamic capillary pressure in imbibition process

Journal of Petroleum Science and Engineering (2017): Modified shape factor incorporating gravity effects for scaling counter-current imbibition

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EXPERIENCES

UNIVERSITY OF STAVANGER, Norway (2021-2024)

PhD Research Fellow in Petroleum Technology/ Artificial Intelligence

Research on Physics Informed Neural Networks (PINNs) and its application in solving the forward and inverse problems of flow in porous media.

I am planning to embark on a visit to Brown University during the spring 2024, as a participant in a research collaboration involving researchers from the University of Stavanger, Brown University, and Stanford University.

EQUINOR ASA, Norway (2022)

Subsurface Engineer | Reservoir Simulation (intern)

During this two-month internship, I worked on an interesting business/engineering case of related to tying-back of two offshore gas fields while both economical and engineering aspects of the project was needed to be considered. In this project, I could finish the numerical simulation of the investigating case and finally provide statistical business/engineer insights to the management team.

NATIONAL IRANIAN OIL COMPANY (2019)

Reservoir Engineer

The water production issue as a challenging problem in one of southern Iranian gas fields was studies and solutions are provided. Also, distribution of fracture networks in spatial scale is studied. The numerical simulation approach was followed in this involvement.

ZODAN SOLUTIONS LTD., UK (2018-2021)

Scientific Software Developer

Developing commercial software for simulation of thermodynamics of subsurface geofluids including oil, gas, and water

SHIRAZ UNIVERSITY/PETROAZMA OIL COMPANY (2016-2018)

Reservoir Simulation Engineer | Research Assistant

Pore to field scale study of EOR methods in several Iranian oil fields. Screening of EOR methods, experiment design and evaluation, upscaling, numerical and analytical simulation, geological analysis, pilot design and proposal preparation. Also, research assistant at academic research projects and advisor of several master students.

PETROTIRAZIS OIL COMPANY PTED., Iran (2016)

Software Developer

Development of software related to petroleum industry. The software was used for providing fast-track development plan in the early stages of field development projects.

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HONORS & AWARDS

2022
Awarded an innovation research stipend (Funded by: Validé AS, Stavanger, Norway)
- Development of a new generation of solvers for the interpretation of core-scale experiments

2019
Ranked 3rd in Second Iranian Petro Match (IPM)
- A hackathon: optimization of well-placing in a highly heterogeneous oil field

2018-Present
Journal and Conference Reviewer

- Journal of Petroleum Science and Engineering
- Journal of Computational Geosciences
- Journal of Natural Gas Science and Engineering
- ACS Omega
- Journal of Geophysics and Engineering
- Journal of Molecular Liquids
- Journal of Petrophysics
- EAGE Conferences

2019
3 Years Distinguished Researcher of EOR Research Centre at Shiraz University

2017
Distinguished Researcher of EOR Research Centre at Shiraz University

2017
Winner of Military Service Exemption Award of Iran's National Elites Foundation

2010-2014
Full scholarship of National Iranian Oil Company (NIOC),
B.Sc., Petroleum University of Technology

2010-2014
Ranked among the 1st 0.5% of participants in the National Entrance Exam for the Universities of Iran

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PROJECTS & ACTIVITIES

Development of Commercial Reservoir Fluid Thermodynamics Software

2018-2020

The modelling of reservoir fluid properties is highly critical for the prediction of the dynamic behaviour of subsurface reservoirs. In this project (in ZODAN Solutions), a newly designed reservoir fluid properties tool is developed. I was both reservoir engineering researcher and software developer in this project. It was tried to add new exciting capabilities to the software to resolve the weakness of currently available tools.

A Data-Mining Approach for Analysis of Computed Tomography Images related to Injection of Nanoparticle Fluids in Reservoir Rocks

2020

Nanoparticles may be used with drilling fluids to improve their efficiency. In this project, we used Python capabilities to investigate the impacts of the composition of the injected fluid on the changes in the pore structure of rock (damage), obtained from the X-Ray Tomography images.

Optimization of Maximizing Oil Recovery Factor of OLYMPUS Oil Field

2019

The objective of the match was the optimization of production and providing development plans by considering the technical and economical sides in the OLYMPUS simulation model. The various technical and economic goals, as well as machine learning methods like Genetic-Algorithms (GA), and neural network (NN) was used.

Core to Field Scale Reservoir Simulation and Pilot Design Study of Chemical Flooding in an Iranian Offshore Oil Field

2017-2018

The project was financed by the National Iranian Oil Company (NIOC) and was requested to simulate the nano flooding process in the selected oil field. The project was very rewarding for me as a reservoir engineer and project manager. It provided me worthful skills in Experiment Design/QC, Core Scale Simulation, upscaling of experiment results to the field scale, full-field numerical simulation, and pilot design.

Software Development: Field Development Plan

2017

The objective of this software was providing a fast field development idea to reservoir engineers with having minimum possible data from the objective field. I was software developer and reservoir engineer at this contribution.

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JOURNAL ARTICLES

Application of Physics-Informed Neural Networks for Estimation of Saturation Functions from Countercurrent Spontaneous Imbibition Tests
SPE Journal (2023) – SPE-218402-PA
Jassem Abbasi, Pål Østebø Andersen

Simulation and Prediction of Counter current Spontaneous Imbibition at Early and Late Times Using Physics-Informed Neural Networks
Energy and Fuels (2023)
Jassem Abbasi, Pål Østebø Andersen

Physical Activation Functions (PAFs): An Approach for More Efficient Induction of Physics into Physics-Informed Neural Networks (PINNs)
arXiv preprint arXiv:2205.14630 (UNDER REVIEW)
Jassem Abbasi, Pål Østebø Andersen

Theoretical Comparison of Two Setups for Capillary Pressure Measurement by Centrifuge
Heliyon
Jassem Abbasi, Pål Østebø Andersen

A Novel Physics based Method for Modelling COVID-19
medRxiv
Harris Sajjad Rabbani, Kofi Osei-Bonsu, Jassem Abbasi, Peter Kwame Osei-Bonsu, Thomas Daniel Seers

A Multiscale Study on the Effects of Dynamic Capillary Pressure in Two-Phase Flow in Porous Media
Korean Journal of Chemical Engineering, 2020
Jassem Abbasi, Mojtaba Ghaedi, Masoud Riazi

On the Impact of Solutal Marangoni Convection during Chemical Flooding for Improved Oil Recovery
Petroleum Science, 2020
Sepideh Palizdan, Jassem Abbasi, Masoud Riazi, Mohammadreza Malayeri

Prediction of multiphase critical choke flow behavior by using a rigorous artificial neural network method
Journal of Flow Measurement and Instrumentation, 2019
Saeed Rashid, Ali Ghamartale, Jassem Abbasi, Hoda Darvish, Afshin Tatar

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JOURNAL ARTICLES (cont.)

A new numerical approach for investigation of the effects of dynamic capillary pressure in imbibition process
Journal of Petroleum Science and Engineering, 2018
Jassem Abbasi, Mojtaba Ghaedi, Masoud Riazi

Improvements in scaling of counter-current imbibition recovery curves using a shape factor including permeability anisotropy
Journal of Geophysics and Engineering, 2018
Jassem Abbasi, Shiva Sarafrazi, Masoud Riazi, Mojtaba Ghaedi

Modified shape factor incorporating gravity effects for scaling counter-current imbibition
Journal of Petroleum Science and Engineering, 2017
Jassem Abbasi, Masoud Riazi, Mojtaba Ghaedi, Abouzar Mirzaei-Paiaman

Discussion on Similarity of Recovery Curves in Scaling of Imbibition Process in Fractured Porous Media
Journal of Natural Gas Science and Engineering, 2016
Jassem Abbasi, Mojtaba Ghaedi, Masoud Riazi

A Simulation investigation of Performance of Polymer Injection in Hydraulically Fractured Heterogeneous Reservoirs
Journal of Petroleum Exploration and Production Technology, 2016
Jassem Abbasi, Babak Raji, Masoud Riazi, Azim Kalantari Asl

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CONFERENCE ARTICLES

Simulation of Multi-Phase Flow in Fractured Porous Media Using Physics-Informed Neural Networks
ICLR 2024, Vienna, Austria
Jassem Abbasi, Pål Østebø Andersen, Ameya Jagtap, Takeshi Kurtori, Aksel Hiorth, Anthony Kovscek.

Application of Physics-Informed Neural Networks for Estimation of Saturation Functions from Countercurrent Spontaneous Imbibition Tests
EAGE IOR 2023, Netherland
Jassem Abbasi, Pål Østebø Andersen

Simulation and Prediction of Counter-current Spontaneous Imbibition at Early and Late Times Using Physics-Informed Neural Networks
SPE EUROPEC 2023, July, Vienna, Austria
Jassem Abbasi, Pål Østebø Andersen

Improved Initialization of Non-linear Solvers in Numerical Simulation of Flow in Porous Media with a Real-time Deep Learning Approach
SPE EUROPEC 2022, July, Madrid, Spain
Jassem Abbasi, Pål Østebø Andersen

Machine learning Assisted Study on Determination of the Most Relevant Parameters for Prediction of Permeability of Tight Sandstones in Mercury Injection Capillary Pressure Tests
SPWLA (SPE) Stavanger 2022, June, Stavanger, Norway
Jassem Abbasi, Jiuyu Zhao, Sameer Ahmed, Jianchao Cai, Pål Østebø Andersen

Theoretical Comparison of Two Setups for Capillary Pressure Measurement by Centrifuge
EAGE IOR 2021, Online
Jassem Abbasi, Pål Østebø Andersen

Pore Scale Direct Numerical Simulation of Simultaneous Marangoni-driven Convection and Mass Diffusion in a Chemical Flooding Process
82th EAGE Annual Conference & Exhibition 2020, Amsterdam
Jassem Abbasi, Sepideh Palizdan, Masoud Riazi, Mohammadreza Malayeri

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CERTIFICATES

Machine Learning

By **Stanford University** (hosted by **Coursera**)

In Progress

Physics-Informed Neural Networks (PINNs)

By **KTH** and **Brown** universities

July 2023 – No Expiration Date

Fundamentals of Scalable Data Science

By **IBM** (hosted by **Coursera**)

June 2020 – No Expiration Date

Fundamentals of Digital Marketing

By **Google**

July 2020 – No Expiration Date

OpenFOAM & Computational Fluid Dynamics (CFD)

By **Shiraz University**

April 2019 – No Expiration Date

Reservoir Simulation – ECLIPSE

By **Petroleum University of Technology**

June 2015 – No Expiration Date

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TEACHING EXPERIENCES

Advanced Fluid Phase Equilibrium Calculations (workshop)
Shiraz University, 2018
Lecturer

Advanced MATLAB Programming Language (workshop)
Shiraz University, 2018
Lecturer

Reservoir Fluid Properties
Shiraz University, 2017
Teacher Assistant

Reservoir Simulation
Shiraz University, 2017
Teacher Assistant

ECLIPSE Reservoir Simulation Software
Shiraz University, 2015-2017
Software Instructor

PVTi and PVTsim Fluid Modelling Software
Shiraz University, 2016
Software Instructor

PipeSim Production Engineering Software
Shiraz University, 2016
Software Instructor

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REFERENCES

Pål Østebø Andersen
2020-Present, University of Stavanger
Associate Professor; Pal.andersen@uis.no

Zohrab Dastkhan
2018-2020, Zodan Solutions, currently in Qatar Petroleum
Consultant Reservoir Engineer/Software Developer, London/Doha; zdastkhan@gmail.com

Farokh Shoaei
2022, Equinor, Norway
Leader Reservoir Technology; ffk@equinor.com

Harris Rabbani
2021, Texas A&M University at Qatar
Engineering Assistant Professor; harris.rabbani@qatar.tamu.edu