Sam (Mahdi) Mousavi

Process Development Engineer

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PROFESSIONAL SUMMARY

Process development engineer experienced in developing and validating multiphase flow, liquid–liquid extraction, and heat and mass transfer models. Skilled in OpenFOAM, Aspen Plus/ACM, Python, Matlab, C++, and machine-learning-based surrogate modelling and optimization.

RESEARCH & PROFESSIONAL POSITIONS

1. **Doctoral Researcher**, Aalto University, Espoo, Finland   2022–Present
   - Developed a liquid–liquid extraction (LLX) modelling framework with surfactant effects, back-mixing, droplets population balance modelling (PBM), and mass transfer (custom C++ software), including stage-efficiency calculation as a core output.
   - PBM–CFD coupling in *OpenFOAM* for droplet evolution, and back–mixing calculation.
   - Built a custom ACM model in Aspen Plus using stage-efficiency outputs to realistically represent process inefficiencies; developed a Matlab decanter model for surfactant-induced phase separation; validation against experimental/pilot data.
   - Reporting to academic–industry stakeholders; pilot test design support; reproducible workflows; resulted in peer-reviewed publications and conference presentations.

2. **SharePoint & Power BI Developer**, MAPSA, Tehran, Iran   2019–2022
   - Built and maintained SharePoint solutions (sites/permissions, custom forms, web parts) with change control and end-user support.
   - Delivered reporting stack (Power BI/SSRS) with automated refresh; Power Query/T-SQL/DAX modelling; data quality checks and training.

3. **Research Assistant**, Permlab Research Center, TMU, Tehran, Iran   2018–2019
   - 3D-printed micromodel workflow from CT rock images; miscible/immiscible tracer injection experiments in transparent microfluidic networks; CFD validation in *Ansys Fluent* with SSIM-based image comparison; imaging/data processing; resulted in a peer-reviewed publication.
   - Simulation-driven well-placement optimization across multiple reservoir scenarios; Python automation coupled to a commercial reservoir simulator to generate training datasets; comparison of CCD (RSM) vs. XGBoost for NPV prediction and optimization; resulted in peer-reviewed publications and conference presentations.

4. **Research Assistant**, EOR Research Center, Shiraz University, Shiraz, Iran   2017–2018
   - Nanoparticle effects on interfacial tension in heavy-oil/brine systems (Co_3O_4 0.01–1 wt%); standardized test conditions and data logging; resulted in peer-reviewed publication.

EDUCATION

- Ph.D., Chemical Engineering — Aalto University, Espoo, Finland   2022–Present
- M.Sc., Petroleum Engineering – Reservoirs — TMU, Tehran, Iran   2017–2020
- B.Sc., Petroleum Engineering – Reservoirs — Shiraz University, Shiraz, Iran   2013–2017

SKILLS

Programming & Scripting Languages

Advanced   Python, Matlab, Bash

Intermediate   C++

Modelling & Simulation Software

Advanced   OpenFOAM, SLB Eclipse

Intermediate   Aspen Plus, Aspen Custom Modeler, Ansys Fluent, COMSOL

Machine Learning & Data Analysis

Advanced   NumPy, Matplotlib, Pandas, Jupyter Notebook, Power BI

Intermediate   scikit-learn, Machine learning algorithms (GB, CatGB, MLP, ...)

Others

Advanced   Linux, HPC environments, PyCharm, VSCode, Overleaf, LaTeX

Intermediate   Git, GitHub, Blender, Docker, N8N, nginx

Chemical Engineering Concepts

Core   Transport phenomena; process simulation & design; population balance modelling; experimental design & pilot test planning; thermodynamics, phase behavior & surfactant systems; mass & heat balances; equipment sizing

Language

Advanced   English

Basic   Finnish

PUBLICATIONS

1. Redefining Stage Efficiency in Liquid-Liquid Extraction: Development and Application of a Modified Murphree Efficiency. **M. Mousavi**, V. Alopaeus (2025).

2. Mathematical Framework for Combined Modeling of Liquid–Liquid Extraction and Phase Separation in Surfactant-Containing Systems. **M. Mousavi**, V. Alopaeus (2025).

3. Modeling oil/water emulsion separation in batch systems with population balances in the presence of surfactant. **M. Mousavi**, A. Bernad, V. Alopaeus (2024).

4. Machine-Learned Surrogate Models for Efficient Oil Well Placement Under Operational Reservoir Constraints. **M. Mousavi**, F. Enzmann, M. Kersten, S. Sadeghnejad (2023).

5. Evaluation of 3D printed microfluidic networks to study fluid flow in rocks. **M. Mousavi**, S. Sadeghnejad, M. Ostadhassan (2021).

6. Optimal Well Placement Using Machine Learning Methods: Multiple Reservoir Scenarios. **M. Mousavi**, H. Jabbari, M. Darab, M. Nourani, S. Sadeghnejad (2020).

7. On the impact of Co_3O_4 nanoparticles on interaction of heavy oil and brine mixtures. S. Hassanpour, M.R. Malayeri, M. Riazi, **M. Mousavi**, Z. Negahban (2017).

REFERENCES

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