

Hossein Izadi (Ph.D, E.I.T)

Precise Downhole Solutions | 3421 8th St | Nisku, AB T9E 8T3 | (780)955-0017 |

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Expertise

- Researcher and mentor with 10+ years of experiences across multiple areas, including:
 - The application of artificial intelligence and data science in subsurface engineering, research, services, and management.
 - Intelligent programming, image processing and analysis, and modifying machine learning algorithms in Geosciences.
 - Reservoir and downhole numerical simulation.
- Possesses a natural aptitude for communication, analytical problem solving, team leading, and project management towards the development and providing engineering solutions.

Professional Experience

R&D Engineer

Feb 2024 - Present

Precise Downhole Solutions. Nisku, AB

- Developing data-analytics algorithms to evaluate the performance of the downhole technologies.
- Developing an intelligent algorithm to model the DTS and DAS data and employing the model on real-world operations.
- Creating a big database of real-world operations in North America to assess and compare the performance of different artificial lift technologies.

Postdoctoral Fellow

Feb 2024 - Present

Department of Electrical and Computer Engineering, University of Alberta. Edmonton, AB

- Co-supervising PhD and MSc students in their graduate studies.
- Applying machine learning methods to predict future oil production and emissions of Canadian SAGD oil and gas operations.

Graduate Research Engineer

Jan 2020 - Jan 2024

Department of Civil and Environmental Engineering, University of Alberta. Edmonton, AB

- Created a database of Canadian oil production for over 12,000 wells by developing data-analysis and image processing codes to digitize counter maps and log images.
- Developed an intelligent algorithm to determine the reservoir quality along oil wells by easy-gathered and low-cost data as particle size distribution.
- Designed a proper flow control device to manage the reservoir production in a numerical simulation to increase the oil production and reduce greenhouse gas emission.

- Developed intelligent algorithms to assist with future well-pad development in Canadian SAGD projects to increase oil production and lower greenhouse gas emission.

Training and Development Manager

July 2018 - Sep 2019

MAPSA, Tehran, Iran

- Leading a team to conceptualize and deliver a competency management tool for petrophysics engineers by providing a professional evaluation system to provide relevant training courses.
- Conceptualized and delivered two lectures on Digital Rock Physics course to 35 of students by providing the most up to dated technology about imaging of rock samples.

Digital Rock Physics Director

Dec 2015 - June 2018

University of Tehran, Tehran, Iran.

- Leading a team to develop an intelligent system to model well trajectory of wellbore stability by employing well logging information and geomechanical methods.
- Developed software to read and analyze the 3D X-ray images of rock samples by employing novel image processing algorithms.

Educations

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- **B.Sc.**, Mining Engineering, University of Birjand, Birjand, Iran **2008 - 2013**
Project: An intelligent method for mineral segmentation and identification in thin sections using machine learning and pattern recognition algorithms.
 - **M.Sc.**, Petroleum Engineering, University of Tehran, Tehran, Iran **2013 - 2015**
Thesis: Porosity determination of reservoir plugs using medical imaging obtained from a carbonate reservoir in south of Iran, an approach based on machine learning algorithms.
 - **Ph.D.**, Petroleum Engineering, University of Alberta, AB, Canada **2020 - 2023**
Thesis: Inflow and outflow rates control in SAGD wells: an integrated approach of data-driven and numerical simulation analysis.

Honors and Awards

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- Mitacs Elevate **2024 - 2026**
 - Alberta Graduate Excellence Scholarship **2023**
 - Alberta Innovates Graduate Student Scholarship **Sep 2021- Sep 2023**
 - Donald Lougheed Engineering Graduate Scholarship **2021**
 - Department Nominee for the Vanier Canada Graduate Scholarship **2021**
 - Department Nominee for the Izaak Walton Killam Scholarship **2021 & 2023**
 - Leonard E. Gads Teaching Assistant Award **2021**
 - 7th place in the SPWLA PDDA's international contest (between 31 teams) **2020**
 - Mitacs Accelerate **2020 - 2023**
 - Top-talent graduated student award in the M.Sc. program **2017**
 - Outstanding researcher in the M.Sc. program **2015**

- First-rank student in the M.Sc. program
- Master of Science fellowship
- Bachelor of Science fellowship

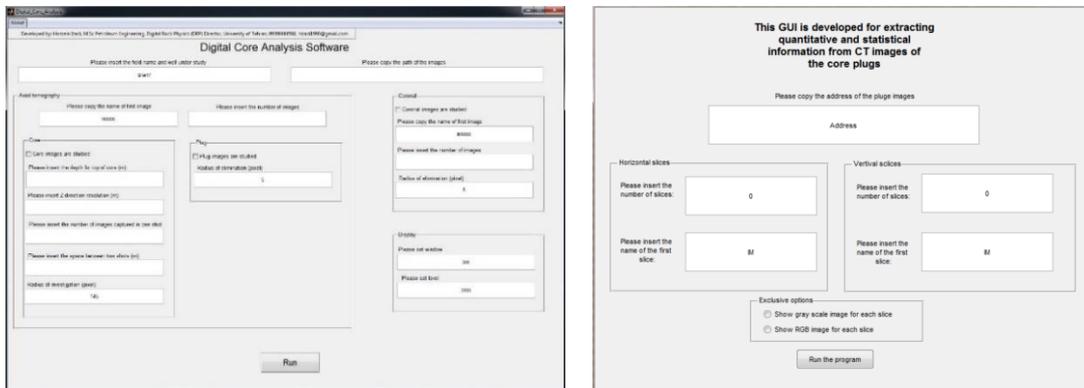
2015
2013 - 2015
2008 - 2013

Software and Programming Languages

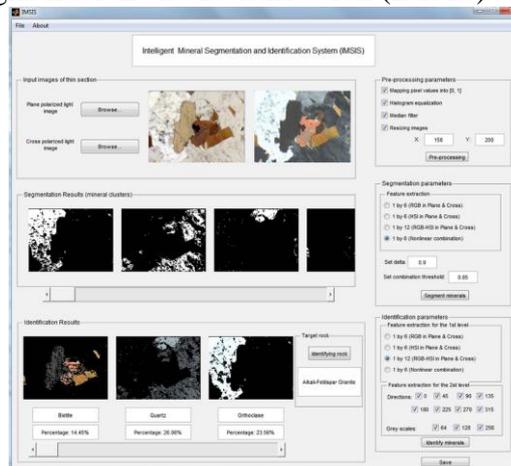
- Matlab, full professional.
- Python, full professional.
- CMG STARS, full professional.
- SLB Petrel, PipeSim, full professional.
- ImageJ, full professional.
- Avizo, professional.

Developed Research-Based Software

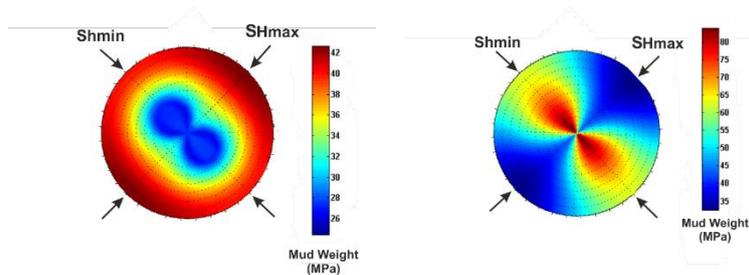
- Digital Rock Physics



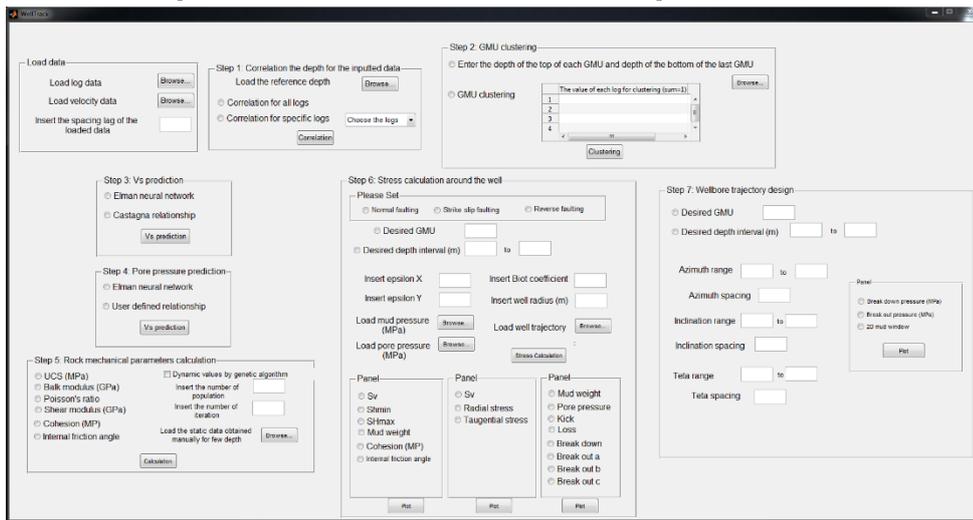
- Intelligent Mineral Segmentation and Identification (IMSI)



- Earth model and well trajectory



Safe window for mud pressure to avoid shear failure Safe window for mud pressure to avoid tensile failure



Teaching Experience

- Teaching assistant, Linear Algebra, University of Alberta, Winter 2023.
- Teaching assistant, Calculus I, University of Alberta, Fall 2022 & Fall 2023.
- Teaching assistant, Advanced Production Engineering, University of Alberta, Fall 2022.
- Teaching assistant, Modeling in Petroleum Engineering, University of Alberta Winter 2021.
- Instructor and course developer, Machine learning application in petroleum industry, 2019, MAPSA Co., Tehran, Iran.
- Instructor and course developer, Digital Rock Physics: a new approach in petroleum industry, 2019, MAPSA Co, Tehran, Iran.
- Instructor, Academic writing, Central library education, 2018, University of Tehran, Tehran, Iran.
- Instructor and developer, Competency definition, improvement, and assessment for employees in upstream petroleum industry, MAPSA Co, 2018.
- Teaching assistant, Artificial Intelligence application in rock mechanics and petroleum exploration, University of Tehran, Fall 2017.
- Instructor, Image processing and analysis in geosciences, Faradars online learning foundation, 2015.

Industrial Collaborations

- Permeability estimation based on PSD and porosity for sand control application, Alberta oil industry, 2020.
- Particle Size Distribution (PSD) clustering to optimize sand control design process, Alberta oil industry, 2020.
- Diagnosing learning disabilities in Woodcock Johnson test based on machine learning methods, Atieh Clinical Neurosciences Center, 2019.
- QEEG and EEG signal analysis based on machine learning methods, Atieh Clinical Neurosciences Center, 2019.
- Investigation of Reservoir Depletion Effects on Casing Collapse in Marun & Kupal Oil fields, 2018.
- Digital rock physics, three dimensional imaged-based reconstruction and two-phase flow simulation for determining petrophysical properties, 2017, Iran National Science Foundation (INSF), Tehran, Iran.

Recent Talks

- FCD and Liner Floation: Key Technology Driver in Extreme Extended Reach Shallow SAGD Wells, In SPE Thermal Well Integrity and Production Symposium, 2023.
- Unsupervised PSD clustering to assess reservoir quality along the horizontal wells: An efficient inflow control devices design, In SPE Canadian Energy Technology Conference and Exhibition, 2023.
- Data-driven decision-making strategy for thermal well completion, In SPE Thermal Well Integrity and Production Symposium, 2022.
- An intelligent system for multi-label classification based on particle size and shape features using a cascade approach. SPE Trinidad & Tobago Section Energy Resources Conference, Trinidad and Tobago, 2021.
- Hybrid Intelligent Algorithm for Permeability Estimation Based on Particle Size Distribution and Porosity Data, Geoconvention, Canada, 2020.
- A detailed workflow for reservoir engineering studies in machine learning point of view, a case study of an international contest, Guest speaker in Geoscience Data Mining Lecture Series, School of Earth Sciences, Zhejiang University, Hangzhou, China, in summer 2020.

Student Co-Supervision

- Ph.D.: Farzaneh Rezaei, Estimation of some of the physical and mechanical properties of carbonate reservoirs using digital rock physics approach, University of Tehran, 2016/09-2018/12.
- M.Sc.: Fatemeh Hormozzade, developing a correlation between permeability versus attenuation coefficient, determined from X-ray computed tomography of plugs, a case study in one of the hydrocarbons, University of Tehran, 2016/09-2017/08.

Patent

- **Izadi, H** (60%), Memarian, H (10%), Soltanian-Zadeh, H (10%), Baniassadi, M (10%), Mehrgini, B (10%), Effective and total porosity determination and 3D visualization of porous media of plugs obtained from carbonate hydrocarbon reservoirs using medical X-ray tomography images, 2015. Certification No. in Iran: 87051.

Publications

- Journal papers:

1. **Izadi, H.**, Leung, J.Y., Soroush, M., Roostaei, M., Mahmoudi, M., Stevenson, J., Tuttle, A., Sutton, C., Mirzavand, R. and Fattahpour, V., **2024**. Impact of Inflow and Outflow Rate Control to Minimize Freshwater Usage: Historical Canadian Steam-Assisted Gravity Drainage Operations versus Numerical Simulations. **Energy & Fuels**, 38 (4), 2952-2968. <https://doi.org/10.1021/acs.energyfuels.3c03801>.
2. **Izadi, H.**, Leung, J.Y., Roostaei, M., Mahmoudi, M., Stevenson, J., Tuttle, A., Sutton, C., Mirzavand, R. and Fattahpour, V., **2024**. A practical workflow to design inflow control devices in SAGD projects to increase production and lower freshwater usage. **Fuel**, 356, p.129454. <https://doi.org/10.1016/j.fuel.2023.129454>.
3. **Izadi, H.**, Leung, J.Y., Roostaei, M., Mahmoudi, M., Stevenson, J., Tuttle, A., Sutton, C., Mirzavand, R. and Fattahpour, V., **2023**. Data-driven analysis of using flow control devices and extended reach wells on SAGD well performance. **Geoenergy Science and Engineering**, 231, p.212336. <https://doi.org/10.1016/j.geoen.2023.212336>.
4. **Izadi, H.**, Roostaei, M., Hosseini, S.A., Soroush, M., Mahmoudi, M., Devere-Bennett, N., Leung, J.Y. and Fattahpour, V., **2022**. A hybrid GBPSO algorithm for permeability estimation using particle size distribution and porosity. **Journal of Petroleum Science and Engineering**, 217, p.110944.. <https://doi.org/10.1016/j.petrol.2022.110944>.
5. Yu, Y., Xu, C., Misra, S., Li, W., Ashby, M., Pan, W., Deng, T., Jo, H., Santos, J.E., Fu, L., Wang, C., Kalbekov, A., Suarez, V., Kusumah, E.P., Aviandito, M., Pamadya, Y., **Izadi, H.**, **2021**. Synthetic Sonic Log Generation with Machine Learning: A Contest Summary from Five Methods. **Petrophysics-The SPWLA Journal of Formation Evaluation and Reservoir Description**, 62(04), pp.393-406. <https://doi.org/10.30632/PJV62N4-2021a4>.
6. Roostaei, M., Cespedes, E.A.M., Uzcátegui, A.A., Soroush, M., Hosseini, S.A., **Izadi, H.**, Schroeder, B., Mahmoudi, M., Gomez, D.M., Mora, E. and Alpire, J., **2021**. Optimization of slotted liner in rubiales field: trade-off between sand control, flow performance, and plugging tendency. **SPE Journal**, 26(03), pp.1110-1130. <https://doi.org/10.2118/199062-PA>.
7. **Izadi, H.**, Sadri, J., Hormozzade, F. and Fattahpour, V., **2020**. Altered mineral segmentation in thin sections using an incremental-dynamic clustering algorithm. **Engineering Applications of Artificial Intelligence**, 90, p.103466. <https://doi.org/10.1016/j.engappai.2019.103466>.
8. Hormozzade, F., Baniassadi, M., Sahabi, F., **Izadi, H.** and Memarian, H., **2019**. Investigation of the carbonate rock permeability based on medical x-ray tomography images. **Scientific Quarterly Journal of Geosciences**, 28(110), pp.193-200. <https://doi.org/10.22071/gsj.2019.84442>.
9. Rezaei, F., **Izadi, H.**, Memarian, H. and Baniassadi, M., **2019**. The effectiveness of different thresholding techniques in segmenting micro CT images of porous carbonates to estimate porosity. **Journal of Petroleum Science and Engineering**, 177, pp.518-527. <https://doi.org/10.1016/j.petrol.2018.12.063>.
10. **Izadi, H.**, Baniassadi, M., Hormozzade, F., Dehnavi, F.N., Hasanabadi, A., Memarian, H. and Soltanian-Zadeh, H., **2018**. Effect of 2D image resolution on 3D stochastic reconstruction and developing petrophysical trend. **Transport in Porous Media**, 125, pp.41-58. <https://doi.org/10.1007/s11242-018-0997-2>.
11. Mehrgini, B., **Izadi, H.** and Memarian, H., **2019**. Shear wave velocity prediction using Elman artificial neural network. **Carbonates and Evaporites**, 34, pp.1281-1291. <https://doi.org/10.1007/s13146-017-0406-x>.

12. **Izadi, H.**, Sadri, J. and Bayati, M., **2017**. An intelligent system for mineral identification in thin sections based on a cascade approach. **Computers & Geosciences**, 99, pp.37-49. <https://doi.org/10.1016/j.cageo.2016.10.010>.
 13. **Izadi, H.**, Baniassadi, M., Hasanabadi, A., Mehrgini, B., Memarian, H., Soltanian-Zadeh, H. and Abrinia, K., **2017**. Application of full set of two point correlation functions from a pair of 2D cut sections for 3D porous media reconstruction. **Journal of Petroleum Science and Engineering**, 149, pp.789-800. <https://doi.org/10.1016/j.petrol.2016.10.065>.
 14. **Izadi, H.**, Sadri, J. and Agha Mehran, N., **2016**. Automatic mineral segmentation in petrographic thin sections using image processing and clustering algorithms. **Journal of Machine Vision and Image Processing**, 2(2), pp.1-13. <https://doi.org/10.1001/1.23831197.1394.2.2.1.5>.
 15. **Izadi, H.**, Sadri, J. and Mehran, N.A., **2015**. A new intelligent method for minerals segmentation in thin sections based on a novel incremental color clustering. **Computers & Geosciences**, 81, pp.38-52. <https://doi.org/10.1016/j.cageo.2015.04.008>.
 16. **Izadi, H.**, Nowrouzi, G.H., Roshan Ravan, B. and Shakiba, S., **2014**. Inverse analysis of geomagnetic investigations for local anomaly detection using genetic algorithm. **Journal of Earth and Space Physics**, 40(2), pp.125-138. <https://doi.org/10.22059/jesphys.2014.50638>.
 17. Javanshir, S., **Izadi, H.**, Tavakoli Mohammadi, M.R. and Sabeti, H., **2014**. A Modified Correlation for Drop Size Distribution in an Experimental Mixer-Settler using Particle Swarm Optimization Algorithm. **Separation Science and Technology**, 49(4), pp.553-561. <https://doi.org/10.1080/01496395.2013.855230>.
 18. Massinaei, M., Falaghi, H. and **Izadi, H.**, **2013**. Optimisation of metallurgical performance of industrial flotation column using neural network and gravitational search algorithm. **Canadian Metallurgical Quarterly**, 52(2), pp.115-122. <https://doi.org/10.1179/1879139512Y.0000000054>.
- **Conference papers:**
 19. **Izadi, H.**, Roostaei, M., Mahmoudi, M., Stevenson, J., Tuttle, A., Bustamante, G., Rhein, S., Sutton, C., Mirzavand, R., Leung, J.V. and Fattahpour, V., **2023**, November. Flow Control Device and Liner Floation: Key Technology Driver in Extreme Extended Reach Shallow Steam Assisted Gravity Drainage Wells. **In SPE Thermal Integrity and Design Symposium** OnePetro. <https://doi.org/10.2118/217423-MS>.
 20. **Izadi, H.**, Roostaei, M., Mahmoudi, M., Rosi, G., Stevenson, J., Tuttle, A., Sutton, C., Mirzavand, R., Leung, J.Y. and Fattahpour, V., **2023**, March. Unsupervised PSD Clustering to Assess Reservoir Quality Along the Horizontal Wells: An Efficient Inflow Control Devices Design. **In SPE Canadian Energy Technology Conference and Exhibition**. OnePetro. <https://doi.org/10.2118/212812-MS>.
 21. **Izadi, H.**, Roostaei, M., Mahmoudi, M., Rosi, G., Stevenson, J., Tuttle, A., Sutton, C., Mirzavand, R., Leung, J.Y. and Fattahpour, V., **2022**, November. Data-Driven Decision-Making Strategy for Thermal Well Completion. **In SPE Thermal Well Integrity and Production Symposium**. OnePetro. <https://doi.org/10.2118/212152-MS>.
 22. **Izadi, H.**, Roostaei, M., Mahmoudi, M., Hosseini, S.A., Soroush, M., Rosi, G., Stevenson, J., Tuttle, A., Sutton, C., Leung, J. and Fattahpour, V., **2022**, March. The Impact of Increase in Lateral Length on Production Performance of Horizontal Thermal Wells. **In SPE Canadian Energy Technology Conference**. OnePetro. <https://doi.org/10.2118/208977-MS>.
 23. **Izadi, H.**, Roostaei, M., Mahmoudi, M., Hosseini, S.A., Soroush, M., Rosi, G., Stevenson, J., Tuttle, A., Sutton, C., Leung, J. and Fattahpour, V., **2021**, November. Data-Driven Well Pad Development Performance Review: Focus on the Role of Liner Design on Well Performance. **In SPE Thermal Well Integrity and Design Symposium**. OnePetro. <https://doi.org/10.2118/208446-MS>.
 24. Yusuf, Y., Roostaei, M., Soroush, M., Rosi, G., Berner, K., Tegegne, N., Mohammadtabar, F., **Izadi, H.**, Zhu, D., Mahmoudi, M. and Fattahpour, V., **2021**, January. Single and Multi-Phase Flow Loop Testing for Characterization and Optimization of Flow Control Devices Used in SAGD: The Effect of Viscosity and Gas-to-Liquid Ratio on Tool Performance. **In SPE Thermal Integrity and Design Symposium**. OnePetro. <https://doi.org/10.2118/203865-MS>.
 25. **Izadi, H.**, Roostaei, M., Soroush, M., Mohammadtabar, M., Hosseini, S.A., Mahmoudi, M., Leung, J. and Fattahpour, V., **2021**, June. An Intelligent System for Multi-Label Classification Based on Particle Size and

- Shape Features Using a Cascade Approach. In **SPE Trinidad and Tobago Section Energy Resources Conference**. OnePetro. <https://doi.org/10.2118/200949-MS>.
26. Soroush, M., Mahmoudi, M., Roostaei, M., **Izadi, H.**, Hosseini, S.A., Leung, J. and Fattahpour, V., **2021**, January. Challenges from well shut-in amid the oil downturn: Long term impacts on near wellbore skin buildup and sand control. In **SPE Thermal Integrity and Design Symposium**. OnePetro. <https://doi.org/10.2118/203854-MS>.
 27. Mayorga Cespedes, E.A., Roostaei, M., Uzcátegui, A.A., Soroush, M., **Izadi, H.**, Hosseini, S.A., Schroeder, B., Mahmoudi, M., Gomez, D.M., Mora, E. and Alpire, J., **2020**, July. Sand Control Optimization for Rubiales Field: Trade-Off Between Sand Control, Flow Performance and Mechanical Integrity. In **SPE Latin America and Caribbean Petroleum Engineering Conference**. Onepetro. <https://doi.org/10.2118/199062-MS>.
 28. **Izadi, H.**, Fattahpour, V., Roostaei, M., Mahmoudi, M., Juliana Leung, Devere-Bennett, N., **2020**, Hybrid intelligent algorithm for permeability estimation based on particle size distribution and porosity data, **Geoconvention**, 11-13 May, Calgary, Canada.
 29. **Izadi, H.**, Fattahpour, V., Roostaei, M., Mahmoudi, M., Devere-Bennett, N., **2019**, Unsupervised and self-adaptive algorithm for particle size distribution clustering, **Geoconvention**, 13-17 May, Calgary, Canada.
 30. **Izadi, H.**, Sadri, J., **2018**, Application of pattern recognition in mineral segmentation and identification, Proceedings of the International Conference on Pattern Recognition and Artificial Intelligence (**ICPRAI**), Concordia University, Quebec, Canada.
 31. Hormozzade, F., Baniassadi, M., Sheidaei, A., **Izadi, H.**, Memarian, H., **2017**. Investigation of the Carbonate Rock Permeability Based on X-Ray Tomography Images. In Proceedings of the **American Society for Composites**, Thirty-second Technical Conference. <https://doi.org/10.12783/asc2017/15173>.
 32. **Izadi, H.**, Mehrgini, B., Memarian, H., Soltanian-Zadeh, H., **2015**, Porosity determination of carbonate reservoir plugs using medical X-ray computed tomography, **77th EAGE conference and exhibition**, 1-4 June, Madrid, Spain.
 33. **Izadi, H.**, Sadri, J. and Mehran, N.A., **2013**, March. Intelligent mineral identification using clustering and artificial neural networks techniques. In **2013 First Iranian Conference on Pattern Recognition and Image Analysis (PRIA)** (pp. 1-5). IEEE. <https://doi.org/10.1109/PRIA.2013.6528426>.
 34. **Izadi, H.**, Sadri, J. and Mehran, N.A., **2013**, September. A new approach to apply texture features in minerals identification in petrographic thin sections using ANNs. In **2013 8th Iranian Conference on Machine Vision and Image Processing (MVIP)** (pp. 257-261). IEEE. <https://doi.org/10.1109/IranianMVIP.2013.6779990>.
 35. Javanshir, S., **Izadi, H.**, Sabeti, H., **2012**, Artificial neural network approach for modeling the extraction of gold in the mixer settler, **XXVI International Mineral Processing Congress (IMPC)**, New Delhi.
 36. Massinaei, M., Falaghi, H., **Izadi, H.**, **2011**, Optimization of an industrial flotation column performance using GSA: Gravitational Search Algorithm, **22nd World Mining Congress & Expo**, 11-16 September, Istanbul.

Professional Involvement

- Peer review for Scientific Journals:
 - IEEE Journal of Selected Topic in Applied Earth Observation and Remote Sensing.
 - Scientific Reports.
 - Engineering Applications of Artificial Intelligence.
 - Journal of Expert Systems with Application.
 - Computers and Geosciences.
 - Earth Science Informatics.
 - Mathematical Geosciences.

- Journal of Carbonates and Evaporates.
- Arabian Journal of Geosciences.
- Journal of Chemometrics.
- Memberships:
 - Society of Petroleum Engineers (SPE).
 - Iran's National Elites Foundation.
- President, SPE Student Chapter, University of Alberta, 2021-2022.