

CURRICULUM VITAE



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Associate Professor in Exploration Geophysics / Rock Physics,
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EDUCATION

- 2009 - 2013
PhD. *Amirkabir University of Technology, Iran.*
Uppsala University, Sweden (visiting).
Thesis topic: Estimation of carbonate reservoir parameters using Bayesian methods and determining the role of structural controls on facies distribution.
In collaboration with *National Iranian Oil Company (NIOC)*
Thesis subject: Seismic Exploration- Rock Physics
- 2006 – 2009
MSc. *Isfahan University of Technology, Iran.*
Thesis topic: Predicting petrophysical parameters of a petroleum reservoir using multivariate statistical and geostatistical methods.
In collaboration with *National Iranian South Oil Company (NISCO)*
Thesis subject: Reservoir modeling- Machine learning- Geostatistics
- 2002 – 2006
BSc. *Sahand University of Technology, Iran.*
Major: Mineral Exploration

EMPLOYMENT

- 2019 to present *Associate Professor*, University of Zanjan, Zanjan, Iran.
2019 to 2021 *Manager of Mining Engineering Group*, University of Zanjan, Zanjan, Iran.
2013 to 2020 *Assistant Professor*, University of Zanjan, Zanjan, Iran.
- 2020 to present *Director of an AI-based startup:*
Pars Intelligent Geo-Researchers (PIGEOR)
“Machine learning computations in geosciences”



HONORS AND VISITS

2021	Best researcher of the year , in Faculty of Engineering of University of Zanjan.
2021	Best lecturer of the year , in University of Zanjan. Outstanding Reviewer
2018	International Journal of Heat and Mass Transfer
2017	Journal of Applied Geophysics
2015	Journal of Petroleum Science and Engineering Visiting researcher/student
7/2022 - 10/2022	Ruhr-University Bochum, Bochum, Germany.
5/2019 - 6/2019	Ruhr-University Bochum, Bochum, Germany.
1/2019 - 2/2019	Ruhr-University Bochum, Bochum, Germany.
9/2012 - 3/2013	Uppsala University, Uppsala, Sweden.
8/2008 - 10/2008	Clausthal University of Technology, Clausthal-Zellerfeld, Germany.

PROFESSIONAL AFFILIATIONS

Member of	Society of Exploration Geophysics (SEG)
	ROCKETH (the Rock Physics Network)
	National Iranian Geophysical Society (NIGS)
	Iranian Petroleum Geomechanics Association (IPGA)
Review Editor of	Frontiers in Earth Science
	Journal of Petroleum Science and Engineering
	Journal of Applied Geophysics
	Geophysics
Reviewer of	Geophysical Prospecting
	Computer and Geosciences
	Journal of Geophysics and Engineering
	Transport in Porous Media
	Advances in Water Resources and 22 other journals.

RESEARCH GRANTS

- [5] Karimpouli S., and Saenger E., **2022** (3 months), Effects of image resolution on velocity computation: A comparison between Berea sandstone real images and machine learning based super resolution images, *Foundation*: German Academic Exchange Service (DAAD) in the program of "Research Stays for University Academics and Scientists, 2022".
- [4] Karimpouli S., **2022**, Future researches and advanced technologies in mineral exploration, *Foundation*: Rasha Co., No: 1400q/17.
- [3] Karimpouli S. and Ghods A., **2020**, Automatic earthquake detection in Iranian seismological network using deep convolutional networks, *Foundation*: Iran National Science Foundation (INSF), No: 99017800.
- [2] Karimpouli S., Saenger E. and Malehmir A., **2019**, Micro-scale physical properties of volcanogenic massive sulphides using digital rock physics, *Foundation*: German Science Foundation (DFG) (GZ: SA 996/7-1, AOBJ: 654072) in the program of "Initiation of International Collaboration", *Fund*: 5000 Euro.

- [1] **Karimpouli S., 2008** (2 months), Visiting student at Clausthal University of Technology, Clausthal-Zellerfeld, Germany, *Foundation*: German Academic Exchange Service (DAAD) in the program of “IAESTE scholarship”.

PUBLICATIONS

-----PEER-REVIEWED JOURNAL ARTICLES-----

- [32] **Karimpouli S.** and Kadyrov, R. **2022**, Multistep Super Resolution Double-U-net (SRDUN) for enhancing the resolution of Berea sandstone images. *Journal of Petroleum Science and Engineering*, 110833.
- [31] Khodaei P., **Karimpouli S.**, Balcewicz M., and Saenger E. H., **2022**, Computing wave velocity of rock sample using rock chips and cuttings, *Journal of Petroleum Science and Engineering*, 209, 1098.
- [30] **Karimpouli, S.**, Tahmasebi, P. and Saenger, E. H., **2021**. Ultrasonic prediction of crack density using machine learning: A numerical investigation. *Geoscience Frontiers*, p.101277.
- [29] Saenger, E.H., Finger, C., **Karimpouli, S.** and Tahmasebi, P., **2021**. Single-Station Coda Wave Interferometry: A Feasibility Study Using Machine Learning. *Materials*, 14(13), p.3451.
- [28] Rezanezhad M., Lajevardi S. A. and **Karimpouli S.**, **2021**, An investigation on prevalent strategies for XFEM-based numerical modeling of crack growth in porous media, *Frontiers of Structural and Civil Engineering*, 15, 914-936.
- [27] Rezanezhad, M., Lajevardi, S. A., and **Karimpouli, S.** **2021**. Application of equivalent circle and ellipse for pore shape modeling in crack growth problem: A numerical investigation in microscale. *Engineering Fracture Mechanics*, 107882.
- [26] **Karimpouli S.** and Tahmasebi P., **2020**, Physics informed machine learning: Seismic wave equation, *Geoscience Frontiers*. 11(6), 1993-2001.
- [25] **Karimpouli S.**, Tahmasebi P., and Ramandi H. L., **2020**, A Review of Experimental and Numerical Modeling of Digital Coalbed Methane: Imaging, Segmentation, Fracture Modeling and Permeability Prediction, *International Journal of Coal Geology*, 228, 103552.
- [24] Rezanezhad M., Lajevardi S.A., and **Karimpouli S.**, **2020**, Effects of pore(s)-crack locations and arrangements on crack growth modeling in porous media, *Theoretical and Applied Fracture Mechanics*, 107, 1-12.
- [23] **Karimpouli, S.**, Faraji, A., Balcewicz, M. and Saenger E., **2020**, Computing Heterogeneous Core Sample Velocity Using Digital Rock Physics: A Multiscale Approach. *Computers and Geosciences*, 135, 104374.
- [22] **Karimpouli, S.**, Tahmasebi, P., and Saenger E. H., **2020**, Coal Cleat/Fracture Segmentation Using Convolutional Neural Networks, *Natural Resources Research*, 29, 1675-1685.
- [21] Rezanezhad M., Lajevardi S. A., and **Karimpouli S.**, **2019**, Effects of pore-crack relative location on crack propagation in porous media using XFEM method, *Theoretical and Applied Fracture Mechanics*, 103, 102241.
- [20] **Karimpouli S.** and Tahmasebi P., **2019**, Segmentation of digital rock images using deep convolutional autoencoder networks, *Computers & Geosciences*, 126, 142-150.
- [19] **Karimpouli S.** and Tahmasebi P., **2019**, Image-based velocity estimation of rock using Convolutional Neural Networks, *Neural Networks*, 111, 89-97.
- [18] **Karimpouli, S.**, and Tahmasebi, P., **2019**. 3D Multifractal Analysis of Porous Media Using 3D Digital Images, *Geophysical Prospecting*, 67, 1082-1093.
- [17] **Karimpouli, S.**, Tahmasebi, P., and Saenger E. H., **2018**. Estimating 3D elastic moduli of rock from 2D thin section images using Differential Effective Medium Theory. *Geophysics*, 83, 211-219.
- [16] **Karimpouli, S.**, Khoshlesan, S., Saenger, E. H. and Koochi, H. H., **2018**. Application of alternative digital rock physics methods in a real case study: a challenge between clean and cemented samples. *Geophysical Prospecting*, 66(4), 767-783.
- [15] **Karimpouli, S.**, and Fattahi, H., **2018**. Estimation of P-and S-wave impedances using Bayesian inversion and adaptive neuro-fuzzy inference system from a carbonate reservoir in Iran. *Neural Computing and Applications*, 29, 1059-1072.

- [14] **Karimpouli, S.**, Tahmasebi, P., Ramandi, H.L., Mostaghimi, P. and Saadatfar, M., **2017**. Stochastic modeling of coal fracture network by direct use of micro-computed tomography images. *International Journal of Coal Geology*, 179,153-163.
- [13] Ghaffari, S. N., and **Karimpouli, S.**, **2017**. Improved relations for permeability-porosity trends using digital rock physic, *Journal of Petroleum Geomechanics*, 1, 41- 52 (In Persian).
- [12] **Karimpouli, S.**, and Tahmasebi, P., **2016**. A Hierarchical Sampling for Capturing Permeability Trend in Rock Physics. *Transport in Porous Media*, 116, 1057-1072.
- [11] **Karimpouli, S.**, and Tahmasebi, P., **2016**. Conditional reconstruction: An alternative strategy in digital rock physics. *Geophysics*, 81(4), D465-D477.
- [10] Fattahi, H. and **Karimpouli, S.**, **2016**. Prediction of porosity and water saturation using pre-stack seismic attributes: a comparison of Bayesian inversion and computational intelligence methods. *Computational Geosciences*, 20(5), 1075–1094.
- [9] **Karimpouli, S.**, Salimi, A. and Ghasemzadeh, S., **2016**. Seminonlinear spectral unmixing using a neural network-based forward modeling. *Journal of Applied Remote Sensing*, 10(3), 036006.
- [8] Shokri, B., Doulati F., and **Karimpouli, S.**, **2016**, Prediction of remained pyrite fraction within a coal waste pile with using of multivariate regression method. *Journal of Environmental Science and Technology*, 18(3), 37-52 (In Persian).
- [7] **Karimpouli, S.**, Abbaszadeh, S., and Amini, E., **2016**, Automatic detection of lineation in satellite images and aerial photos using Radon transform. *Iranian Journal of Mining Engineering*, 10(29), 41-49 (In Persian).
- [6] Salimi A., Ziaii M., Hosseinjani Zadeh M., Amiri A., and **Karimpouli S.**, **2015**, High performance of the support vector machine in classifying hyperspectral data using a limited dataset. *International Journal of Mining and Geo-Engineering*, 49(2) 253-268.
- [5] **Karimpouli, S.**, and Malehmir, A., **2015**. Neuro-Bayesian facies inversion of prestack seismic data from a carbonate reservoir in Iran. *Journal of Petroleum Science and Engineering*, 131, 11-17.
- [4] **Karimpouli, S.**, Malehmir, A., Hassani, H., Khoshdel, H. and Nabi-Bidhendi, M., **2015**. Automated diffraction delineation using an apex-shifted Radon transform. *Journal of Geophysics and Engineering*, 12(2), 199.
- [3] **Karimpouli, S.**, Hassani, H., Malehmir, A., Nabi-Bidhendi, M. and Khoshdel, H., **2013**. Understanding the fracture role on hydrocarbon accumulation and distribution using seismic data: a case study on a carbonate reservoir from Iran. *Journal of Applied Geophysics*, 96, 98-106.
- [2] **Karimpouli, S.**, Hassani, H., Nabi-Bidhendi, M., Khoshdel, H. and Malehmir, A., **2013**. Application of probabilistic facies prediction and estimation of rock physics parameters in a carbonate reservoir from Iran. *Journal of Geophysics and Engineering*, 10(1), 015008.
- [1] **Karimpouli, S.**, Fathianpour, N. and Roohi, J., **2010**. A new approach to improve neural networks' algorithm in permeability prediction of petroleum reservoirs using supervised committee machine neural network (SCMNN). *Journal of Petroleum Science and Engineering*, 73(3), 227-232.

-----CONFERENCE PRESENTATIONS-----

- [31] Mohammadi, M. and **Karimpouli S.**, Comparison of convolutional and autoencoder networks for segmentation of fractures in rock images, *5th Seminar of Petroleum Geophysical Exploration*, **2021**, Tehran, Iran.
- [30] **Karimpouli, S.**, Capability of convolutional networks on predicting rock velocity using multiscale images, *20th Iranian Geophysical Conference*, **2020**, Tehran, Iran.
- [29] **Karimpouli, S.**, and Ghods A., Automatic earthquake detection and phase picking using deep convolutional networks, *20th Iranian Geophysical Conference*, **2020**, Tehran, Iran.
- [28] Khodaei, P. and **Karimpouli, S.**, An investigation on measurement methods of physical and mechanical properties of rock from drilling cutting, *2nd Iranian conference of green mining and mine industry*, **2019**, Zanjan, Iran.

- [27] **Karimpouli, S.**, Segmentation of digital rocks using deep learning, *4th Seminar of Petroleum Geophysical Exploration*, **2019**, Tehran, Iran.
- [26] **Karimpouli, S.**, Estimation of 3D elastic parameters from 2D images, *8th Minisymposium on Poroelasticity*, **2019**, Bochum, Germany.
- [25] **Karimpouli, S.**, Deep Learning methods in digital rock physics: segmentation and parameter estimation, *8th Minisymposium on Poroelasticity*, **2019**, Bochum, Germany.
- [24] **Karimpouli, S.**, Digital Rocks: A review on capabilities of a new technology in computing hydrocarbon reservoir characteristics, *4th Symposium of sedimentological society of Iran*, **2018**, Zanjan, Iran.
- [23] Rezanezhad M., **Karimpouli S.**, and Lajevardi S.A., Numerical modeling of crack propagation in sandstone reservoirs, *4th Symposium of sedimentological society of Iran*, **2018**, Zanjan, Iran.
- [22] Khoshaein E. and **Karimpouli S.**, Grains packing effects on wave velocity in sandstone type hydrocarbon reservoirs, *4th Symposium of sedimentological society of Iran*, **2018**, Zanjan, Iran.
- [21] **Karimpouli, S.**, Tahmasebi, P., and Saenger E.H., A method for estimating 3D elastic moduli of rock using 2D images, *18th Iranian Geophysical Conference*, **2018**, Tehran, Iran.
- [20] Faraji, A., and **Karimpouli, S.**, A multiscale approach to estimate effective elastic moduli using digital rock images, *18th Iranian Geophysical Conference*, **2018**, Tehran, Iran.
- [19] Mohammadi M., **Karimpouli S.**, Masoumi Z., and Ghods A., Site effect characterization of Zanjan city using surface waves, *18th Iranian Geophysical Conference*, **2018**, Tehran, Iran.
- [18] Alavian S.M., Sonei An., and **Karimpouli, S.**, Structural interpretation of South-Pars gas reservoir using seismic attributes, *1st National Conference of Modeling in Mining Engineering*, **2018**, Qazvin, Iran.
- [17] Rezanejad M., **Karimpouli S.**, and Lajevardi S.A., Numerical modeling of crack growth in porous media using XFEM, *1st National Conference of Modeling in Mining Engineering*, **2018**, Qazvin, Iran.
- [16] **Karimpouli, S.**, and Tahmasebi, P., Pore space heterogeneity evaluation of 3D digital rock samples using multifractals, *2nd National Conference on Petroleum Geomechanics*, **2017**, Tehran, Iran.
- [15] Khoshlesan, S., and **Karimpouli, S.**, Two-step computing of effective elastic parameters of rock to preserve microstructures effect using digital rock physics, *2nd National Conference on Petroleum Geomechanics*, **2017**, Tehran, Iran.
- [14] Samiei, S., and **Karimpouli, S.**, Effects of pore type and size on elastic parameters of rock using digital rock modeling, *2nd National Conference on Petroleum Geomechanics*, **2017**, Tehran, Iran.
- [13] Ghasemzadeh, S., **Karimpouli, S.**, and Salimi, A., Hydrothermal alteration mapping using ASTER images to determine the potential of mineralization in Jebal-Barez area, *8th Iranian Conference of Economic Geology*, **2016**, Zanjan, Iran.
- [12] Nazari, S., Arabamiri, A. R., Kamkar, A., and **Karimpouli, S.**, Cu exploration using resistivity and induced polarization methods in Chahar-Gonbad, Kerman, *8th Iranian Conference of Economic Geology*, **2016**, Zanjan, Iran.
- [11] Daviran, M., **Karimpouli, S.**, and Kazemi, M., Geochemical anomaly separation from background using fractal method; Sungun porphyry copper deposit, *8th Iranian Conference of Economic Geology*, **2016**, Zanjan, Iran.
- [10] **Karimpouli, S.**, Khoshlesan, S., and Tahmasebi, P., Prediction of seismic wave velocity of 3D samples using 2D images: A comparison between simulation based and analytical method, *17th Iranian Geophysical Conference*, **2016**, Tehran, Iran.
- [9] Salimi A., Ziaii M., Hosseinjani Zadeh M., Amiri A., and **Karimpouli, S.**, Classification of hydrothermal alteration zones using a Hyperion data and support vector machine, *34th National and 2nd International Geoscience Congress*, **2016**, Tehran, Iran.
- [8] **Karimpouli, S.**, and Jodeiri, B., Comparison of analytical and neural network committee machines to estimate water flow into underground structures: A case study from Amirkabir Tunnel, *1st National Conference on Soft Computing*, **2015**, Roudsar, Iran.
- [7] **Karimpouli, S.**, and Tahmasebi, P., An alternative method in digital rock physics using 2d to 3d image reconstruction, *1st National Conference on Petroleum Geomechanics*, **2015**, Tehran, Iran.

[6] **Karimpouli, S.**, and Tahmasebi, P., 2D to 3D reconstruction: An alternative method in digital rock physics, *2nd Seminar of Petroleum Geophysical Exploration*, **2015**, Tehran, Iran.

[5] Jalili, S., **Karimpouli, S.**, Sattari, A., and Mohamadali-pour, Z., Combination of 2D inversion and 3D modeling of Geo-electric data in Khalifelo copper exploration limits Khoramdare –Zanjan, *33rd National Geosciences Conference*, **2015**, Tehran, Iran.

[4] Nazari, S., **Karimpouli, S.**, and Ahmadi, R., Effect of correlation of variables in S-wave velocity prediction using regression and neural networks method, *5th Iranian Mining Engineering Conference*, **2014**, Tehran, Iran.

[3] Karimpouli, S., Hassani, H., Nabi-Bidhendi, M., Khoshdel, H. and Malehmir, A., Modeling of reservoir fractures using scattered waves and diffraction. *16th Iranian Geophysical Conference*, **2014**, Tehran, Iran.

[2] **Karimpouli, S.**, Hassani, H., Nabi-Bidhendi, M., Khoshdel, H. and Malehmir, A., Modeling of facies distribution in carbonate reservoirs using Bayesian inversion. *1st Seminar of Petroleum Geophysical Exploration*, **2013**, Tehran, Iran.

[1] **Karimpouli, S.**, Fathianpour, N., A new regression model for permeability prediction in a hydrocarbon reservoir from SW of Iran using multivariate statistical method. *1st National Conference of Oil and Gas Exploration*, **2009**, Ahvaz, Iran.

-----**BOOKS**-----

[2] **Karimpouli, S.**, **2016**, Technical English for Students of Mining Engineering. *University of Zanjan Publishing*, P. 250, ISBN: 978-9-648885-69-9.

[1] **Karimpouli, S.**, Hassani, H., Khoshdel, H., Malehmir, A., and Nabi-Bidhendi, M., **2015**, Detection of High-Quality Parts of Hydrocarbon Reservoirs Using Bayesian Facies Estimation: A Case Study on a Carbonate Reservoir from Iran, **Book chapter in** Advances in Data, Methods, Models and Their Applications in Oil/Gas Exploration, *Science Publishing Group*, ISBN: 978-1-940366-20-3.

TEACHING AND SUPERVISING

<i>Undergraduate level (9 years of experience)</i>	
Global geophysics	Exploration geophysics
Well logging	Petroleum geology
Engineering statistics and probabilities	Structural geology
<i>Graduate level (5 years of experience)</i>	
Rock physics	Geostatistics

- **Supervised MSc. projects:** S. Khoshlesan (2017), P. Roshanaei (2017), M. Rezanejad (2018), A. Faraji (2019), M. M. Golabi (2019), M. Besharati (2020), P. Khodaei (2021), M. Mohammadi (2022).
- **Supervisor of ongoing MSc. projects:** R. Moharrami, M. R. Mirghasempour and A. Razavi.
- Supervisor of more than 80 BSc. Projects.

SOFTWARE SKILLS

- **Programming:**

Well versed in problem solving and algorithms especially with MATLAB and scripting machine learning algorithms in PYTHON (Spyder, Keras).

- **Commercial software:**

Familiar with AVIZO, Hampson-Russel, RockWorks and ArcGIS.

RESEARCH INTERESTS _____

- **Digital Rock Physics:**

2D to 3D characterization of digital rocks, Simulation of porous media, Multiscale digital rock physics and Mechanical behavior of porous media.

- **Machine learning in geosciences:**

Applications of machine learning algorithms such as Neural Networks (NN), Convolutional Neural Networks (CNN) and Physics Informed Neural Networks (PINN) in geosciences.

- **Exploration Geophysics:**

Petrophysics, Rock physics, Well to seismic inversion and interpretation, Geostatistics, Mineral exploration methods (seismic and geoelectrical exploration).

REFERENCE PEOPLE _____

Prof. Alireza Malehmir

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