

## CURRICULUM VITAE



### Dr. Sadegh Karimpouli

*Associate Professor* in Exploration Geophysics / Rock Physics,  
Mining Engineering Group, Faculty of Engineering,  
University of Zanjan, Zanjan, Iran.

**Email:** [s.karimpouli@znu.ac.ir](mailto:s.karimpouli@znu.ac.ir)

**Mobile:** (+98) 911 292 9475; **Tel:** (+98) 24 3305 4345

**Website:** [http://www.znu.ac.ir/members/karimpouli\\_sadegh](http://www.znu.ac.ir/members/karimpouli_sadegh)

**GoogleScholar:** <https://scholar.google.com/citations?user=hkNpwOAAAAAJ&hl=en>

Last update: July 2021

## EDUCATION

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2009 - 2013

PhD.

*Amirkabir University of Technology, Iran.*

*Uppsala University, Sweden.*

**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- Rock Physics- Geostatistics

2002 – 2006

BSc.

*Sahand University of Technology, Iran.*

**Major:** Mineral Exploration

## EMPLOYMENT

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2019 to present

2020 to present

2013 to 2020

*Manager of Mining Engineering Group, University of Zanjan, Zanjan, Iran.*

*Associate Professor, University of Zanjan, Zanjan, Iran.*

*Assistant Professor, University of Zanjan, Zanjan, Iran.*

2020 to present

*Director of an AI startup:*

**Pars Intelligent Geo-Researchers (PIGEOR)**

“Machine learning computation in geosciences”



## HONORS AND VISITS

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### *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*

1/2019 - 2/2019	Ruhr-University Bochum, Bochum, Germany.
5/2019 - 6/2019	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

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<b>Organization Member</b>	Society of Exploration Geophysics (SEG) ROCKETH (the Rock Physics Network) National Iranian Geophysical Society (NIGS) Iranian Petroleum Geomechanics Association (IPGA)
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<b>Reviewer of</b>	Journal of Petroleum Science and Engineering Journal of Applied Geophysics Geophysics Geophysical Prospecting Computer and Geosciences Journal of Geophysics and Engineering Transport in Porous Media Advances in Water Resources and 22 other journals.
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## RESEARCH GRANTS

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- [4] Saenger E., Duda M., **Karimpouli S.** and Malehmir A., **2020**, Micro-scale physical properties of volcanogenic massive sulphide deposits using digital rock physics (MOSCITO), *Foundation*: German Science Foundation (DFG), *Fund*: 544.12K Euro (Under review).
- [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, *Fund*: 200M IRR.
- [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**, Visiting student at Clausthal University of Technology, Clausthal-Zellerfeld, Germany, *Foundation*: German Academic Exchange Service (DAAD) in the program of “IAESTE scholarship”.

## PUBLICATIONS

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

- [29] **Karimpouli, S.**, Tahmasebi, P. and Saenger, E.H., **2021**. Ultrasonic prediction of crack density using machine learning: A numerical investigation. *Geoscience Frontiers*, p.101277.
- [28] 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.
- [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., Lejevardi 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, *5<sup>th</sup> Seminar of Petroleum Geophysical Exploration, 2021*, Tehran, Iran.
- [30] **Karimpouli, S.**, Capability of convolutional networks on predicting rock velocity using multiscale images, *20<sup>th</sup> Iranian Geophysical Conference, 2020*, Tehran, Iran.
- [29] **Karimpouli, S.**, and Ghods A., Automatic earthquake detection and phase picking using deep convolutional networks, *20<sup>th</sup> 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, *2<sup>nd</sup> Iranian conference of green mining and mine industry, 2019*, Zanjan, Iran.
- [27] **Karimpouli, S.**, Segmentation of digital rocks using deep learning, *4<sup>th</sup> Seminar of Petroleum Geophysical Exploration, 2019*, Tehran, Iran.
- [26] **Karimpouli, S.**, Estimation of 3D elastic parameters from 2D images, *8<sup>th</sup> Minisymposium on Poroelasticity, 2019*, Bochum, Germany.
- [25] **Karimpouli, S.**, Deep Learning methods in digital rock physics: segmentation and parameter estimation, *8<sup>th</sup> Minisymposium on Poroelasticity, 2019*, Bochum, Germany.
- [24] **Karimpouli, S.**, Digital Rocks: A review on capabilities of a new technology in computing hydrocarbon reservoir characteristics, *4<sup>th</sup> 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, *4<sup>th</sup> 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, *4<sup>th</sup> 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, *18<sup>th</sup> Iranian Geophysical Conference*, **2018**, Tehran, Iran.
- [20] Faraji, A., and **Karimpouli, S.**, A multiscale approach to estimate effective elastic moduli using digital rock images, *18<sup>th</sup> 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, *18<sup>th</sup> 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, *1<sup>st</sup> 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, *1<sup>st</sup> 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, *2<sup>nd</sup> 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, *2<sup>nd</sup> 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, *2<sup>nd</sup> 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, *8<sup>th</sup> 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, *8<sup>th</sup> 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, *8<sup>th</sup> 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, *17<sup>th</sup> 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, *34<sup>th</sup> National and 2<sup>nd</sup> 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, *1<sup>st</sup> 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, *1<sup>st</sup> National Conference on Petroleum Geomechanics*, **2015**, Tehran, Iran.
- [6] **Karimpouli, S.**, and Tahmasebi, P., 2D to 3D reconstruction: An alternative method in digital rock physic, *2<sup>nd</sup> Seminar of Petroleum Geophysical Exploration*, **2015**, Tehran, Iran.
- [5] Jalili, S., **Karimpouli, S.**, Sattari, A., and Mohamadlipour, Z., Combination of 2D inversion and 3D modeling of Geo-electric data in Khalifelo copper exploration limits Khoramdare –Zanjan, *33<sup>rd</sup> 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, *5<sup>th</sup> 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. *16<sup>th</sup> 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. *1<sup>st</sup> 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. *1<sup>st</sup> 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**

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<i>Undergraduate level (8 years of experience)</i>	
Global geophysics	Exploration geophysics
Well logging	Petroleum geology
Engineering statistics and probabilities	Structural geology
<i>Graduate level (4 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).
- Supervisor of ongoing MSc. projects: P. Khodaei, M. Mohammadi and M. R. Mirghasempour.
- Supervisor of more than 70 BSc. Projects.

**SOFTWARE SKILLS**

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- **Programming:**  
Well versed in problem solving and algorithms especially with MATLAB. Also familiar with scripting machine learning algorithms in PYTHON (Keras).
- **Commercial software:**  
Familiar with AVIZO, Hampson-Russel, VISTA, RockWorks and ArcGIS.

**RESEARCH INTERESTS**

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- **Digital Rock Physics:**  
2D to 3D characterization of digital rocks, Simulation of porous media, Multiscale digital rock physics and Mechanical behavior of porous media.
- **Exploration Geophysics:**  
Petrophysics, Rock physics, Well to seismic inversion and interpretation, Geostatistics, Mineral exploration methods (seismic and geoelectrical exploration).

- **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.

**REFERENCE PEOPLE** \_\_\_\_\_

**Prof. Alireza Malehmir**

Department of Earth Science, Uppsala University, Sweden.

*Principal coordinator of H2020 RIA Smart Exploration, EU.*

Email: [alireza.malehmir@geo.uu.se](mailto:alireza.malehmir@geo.uu.se)

Phone: (+46)18 471 2335

**Dr. Pejman Tahmasebi**

Department of Petroleum Engineering, University of Wyoming, USA.

E-mail: [ptahmase@uwyo.edu](mailto:ptahmase@uwyo.edu)

Phone: (+1) 307 766 6555

**Prof. Erik H. Saenger**

Bochum University of Applied Sciences,

Fraunhofer IEG,

Ruhr-University Bochum, Bochum, Germany.

E-mail: [erik.saenger@rockphysics.org](mailto:erik.saenger@rockphysics.org)

Phone: (+49) 234 321 0718

**Dr. Reza Saberi**

CGG Services, The Hague, Netherland.

E-mail: [reza.saberi@cgg.com](mailto:reza.saberi@cgg.com)

Phone: (+31) 70 3046 572