HONGGEUN JO

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EDUCATION

Ph.D. The University of Texas at Austin — GPA: 3.95/4.0 — *Aug/2021*
Petroleum & Geosystems Engineering (Advisor: Dr. M. J. Pyrcz)

M.S. Seoul National University, Korea — GPA: 4.0/4.0 — *Aug/2016*
Petroleum & Natural Gas Engineering (Advisor: Dr. J. Choe)

B.S. Seoul National University, Korea — GPA: 94.8/100 — *Aug/2014*
Energy Resources Engineering (Major) and Mechanical & Aerospace Engineering (Minor)

PROFESSIONAL EXPERIENCE

Inha University (title: Assistant Professor) — *Feb/2023 – Present*
- Research in CCUS, subsurface modeling and simulation, and associated ML applications

BP Full-time (title: Reservoir Engineer) — *Oct/2021 – Feb/2023*
- Developed efficient workflow for data integration, uncertainty quantification, and production forecast in developing oil and gas

Lawrence Livermore National Lab Summer Internship — *June/2021 – Aug/2021*
- Developed ML-assisted dynamic data integration workflow for CO2 sequestration management

BP Summer Internship — *June/2020 – Aug/2020*
- Developed ML-assisted uncertainty quantification workflows for offshore fields (i.e., Mad Dog, Thunder Horse, and Atlantis) of the Gulf of Mexico

Halliburton Summer Internship — *May/2019 – Aug/2019*
- Developed a physics-informed ML proxy flow model and assisted history matching workflow

Graduate Research Assistant — *Sep/2017 – Aug/2021*
- Developed rule-based reservoir modeling for deepwater depositional system and broadened its application with deep-learning algorithm (i.e., GAN) for data conditioning and history matching
- Applied deep neural networks (i.e., UNet+ResNet) to mimic flow simulation in 3D digital rock

Teaching Assistant (Instructor: Dr. M. J. Pyrcz) — *Sep/2017 – Aug/2021*
- Subsurface Machine Learning
- Introduction to Geostatistics

Korea Gas Corporation Full-time — *Sep/2016 – Aug/2017*
- Participated in Indonesia Senoro-Toili natural gas offshore field
- Assisted in analyzing reservoir models and in making a depletion strategy

Graduate Research Assistant — *Sep/2014 – Aug/2016*
- Developed history matching algorithms (i.e., EnKF and ESMDA) with combining machine learning techniques such as PCA, DCT, K-means clustering, and Support Vector Machine

Korea National Oil Corporation – internship — *Jul/2011 - Oct/2011*
- Assisted in managing onshore field drilling and completion workover

SKILLS AND INTERESTS

Proficient in Python (scikit-learn, Tensorflow, PyTorch, and geostatspy), MATLAB, R, Bash
Experienced with code development for high-performance computing platforms through internships
Published 12+ peer-reviewed papers in reservoir engineering and the associated ML applications

LEADERSHIP

Squad Leader, Republic of Korea Army (Military Service) — *Oct/2011- Jul/2013*

PUBLICATIONS

Journal

1. **Jo, H.**, Pyrcz, M.J., Laugier, F., Sullivan, M., "Sensitivity Analysis of Geological Rule-based Subsurface Model Parameters on Fluid Flow," *AAPG Bulletin*, Published in 2023
2. H.Mejia, J.L., **Jo, H.**, Pisel, J., Pyrcz, M.J., "Dynamic time warping for well injection and production history connectivity characterization," *Computational Geoseiences*, Published in 2022
3. **Jo, H.**, Cho, Y., Pyrcz, M.J., Tang, H., and Fu, P., "Machine learning-based porosity estimation from spectral decomposed seismic data," *Geophysics*, Published in 2022.
4. Pan, W., **Jo, H**., Santos, J.E., Torres-Verdin, C., Pyrcz M.J., "Stochastic Pix2Pix Method for Conditional and Hierarchical Deepwater Reservoir Modeling," *AAPG Bulletin*, Published in 2022.
5. **Jo, H.**, Pyrcz M.J., "Automatic Semivariogram Modeling by Convolutional Neural Network," *Mathematical Geosciences*, Published in 2021
6. **Jo, H.**, Wen P., Santos, J.E., Pyrcz M.J., "Machine Learning Assisted History Matching for Deep-water Lobe System," *Journal of Petroleum Science and Engineering,* Published in 2021.
7. Santos, J.E., Yin, Y., **Jo. H.,** Pan, W., Pyrcz, M.J., Lubbers, N., "MS-NET: Computationally Efficient Multiscale Networks Applied to Learning Fluid Flow Dynamics in Permeable Media," *Transport in Porous Media*, Published in 2021
8. **Jo, H.**, Santos, J.E., Pyrcz, M.J., "Conditioning Stratigraphic, Rule-Based Models with Generative Adversarial Network: A Deepwater Lobe Example," *Energy Exploration & Exploitation*, Published in 2020.
9. Santos, J.E., **Jo, H.**, Pyrcz, M.J., "PoreFlow-Net: a 3D convolutional neural network to predict fluid flow through porous media," *Advances in Water Resources*, Published in 2020.
10. Jung, H., **Jo, H.**, Choe, J. "Use of Channel Information Update and Discrete Cosine Transform in Ensemble Smoother for Channel Reservoir Characterization," *Journal of Energy Resources Technology*, Published in 2020.
11. **Jo, H.**, Pyrcz, M.J., "Robust Rule-based Aggradational Lobe Reservoir Models," *Journal of Natural Resources Research*, Published in 2019
12. Jung, H., **Jo, H.**, Choe, J. "Geological model sampling using PCA-assisted support vector machine for reliable channel reservoir characterization," *Journal of Petroleum Science and Engineering*, Published in 2018.
13. Jung, H., **Jo, H.**, Choe, J. "Characterization of various channel fields using an initial ensemble selection scheme and covariance localization," *Journal of Energy Resources Technology*, Published in 2017.
14. Jung, H., **Jo, H.**, Choe, J. "Recursive update of channel information for reliable history matching of channel reservoirs using EnKF with DCT," *Journal of Petroleum Science and Engineering*, Published in 2017.
15. **Jo, H.**, Choe, J. "History Matching of Channel Reservoirs using Ensemble Kalman Filter with Continuous Update of Channel Information," *Energy Exploration & Exploitation*, Published in 2016.

Conference

1. **Jo, H.**, Pyrcz, M. J., "Machine Learning Assisted Production History Matching While Retaining Geological Heterogeneity," Geogulf 2021, Austin, Texas, 27-29 October 2021.
2. **Jo, H.**, Pyrcz, M. J., "Machine learning assisted history matching for a deepwater lobe system," GEOSTATS 2021, Virtual conference, 12-16 July 2021.
3. **Jo, H.**, Pyrcz, M. J., "Conditioning Rule-based Models to Stratigraphy with Machine Learning: Demonstration in Deepwater Lobe System," GSA 2020 Meeting, Virtual conference, 26-30 Oct 2020.
4. **Jo, H.**, Pyrcz, M. J., "Conditioning Stratigraphic, Rule-Based Models With Generative Adversarial Networks: A Deepwater Lobe Example," AAPG 2019 Annual Convention & Exhibition, San Antonio, Texas, 19-22 May 2019.
5. Santos, J. E., Prodanović, M., Xu, D., **Jo, H.**, Pyrcz, M. J., "Predicting fluid flow via convolutional neural networks," Interpore 2019, Valencia, Spain, 6-10 May 2019.
6. Santos, J. E., Prodanović, M., Landry, C. J., **Jo, H.**, "Determining the Impact of Mineralogy Composition for Multiphase Flow through Hydraulically Induced Fractures," Unconventional Resources Technology Conference, Huston, Texas, USA, 23-25 July 2018.
7. Jung, H., **Jo, H.**, Choe, J. "Channelized Reservoir Characterization Using Ensemble Kalman Filter with an Initial Ensemble Selection Scheme," GEOSTAT, Valencia, Spain, 5-9 Sep 2016.
8. **Jo, H.**, Choe, J. "Crossover Use of Ensemble Kalman Filter and Ensemble Smoother for Efficient History Matching," European Association of Geoscientists and Engineers, Madrid, Spain, 1-4 June 2015.

Patent

1. Chaki, S., Wong, T., Camilleri, D., Zagayevskiy, Y., **Jo, H.**, "Estimating Reservoir Production Rates Using Machine Learning Models for Wellbore Operation Control," US patent filed in 2020.