GEOLOGICA
Geothermal Group
Geothermal Resource Solutions

Name: Dr. Kunhwi Kim
Position: Junior Reservoir Engineer
Technical Expertise: Geothermal Reservoir Engineering
Computer-Based Modeling and Numerical Simulation
Software Design and Development
Field Data Interpretation

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EXPERIENCE SUMMARY

Dr. Kunhwi Kim joined Geologica Geothermal Group in November 2019. Prior to that, he was a Postdoctoral Fellow and Project Scientist in Energy Geosciences Division at Lawrence Berkeley National Laboratory. He was involved in R&D projects with emphasis on development and application of computational tools and software for modeling multiphase fluid flow and heat transfer coupled with mechanical behavior in geological media and subsurface environments. He also has extensive experience in simulating fracture formations and flow enhancement within rocks. Demonstrated and potential capabilities of his modeling works are towards a variety of energy-related geological problems.

EXPERTISE

- Reservoir Modeling and Multiphase Flow Simulation
- Geothermal Reservoir Assessment
- Data Synthesis and Conceptual Modeling
- Thermo-Hydro-Mechanical Coupled Analysis
- Fracture Mechanics

EDUCATION

Ph.D., Civil and Environmental Engineering, Yonsei University, Seoul, Korea, 2011
M.Sc., Civil Engineering, Yonsei University, Seoul, Korea, 2006
B.Sc. in Engineering, Civil Engineering, Yonsei University, Seoul, Korea, 2004

AWARDS AND CERTIFICATIONS

- Certificate in TOUGH2 Training Course for Scientists and Engineers, Earth Sciences Division, Lawrence Berkeley National Laboratory, 2014

REPRESENTATIVE PROJECT EXPERIENCE

DECOVALEX 2019 – Task A: Modelling Gas Injection Experiments
- Conducting coupled hydro-mechanical simulations of multiphase fluid transport and fluid pressure-induced fracturing within barrier materials (e.g., compact bentonite, claystone) for geological nuclear waste disposal.

Laboratory and Numerical Investigation of Hydraulic Fracture Propagation and Permeability Evolution in Heterogeneous and Anisotropic Shale
- Development of the TOUGH-RBSN simulator for hydraulic fracture propagation and model validation against laboratory experiments.
- Investigation of complex interactions between newly generated fractures and pre-existing fracture networks during hydraulic fracture propagation.

Dynamic Fracture Simulation in Geomaterials at Multiple Length Scales
- Development of a particle-lattice modeling code for dynamic fracture simulation using high performance computing techniques.
- Conducting coupled thermo-hydro-mechanical simulations of fracture propagation in geomaterials.

Modeling of Excavation Damage Process in Argillaceous Rock Formations
- Implementation of a new modeling scheme for anisotropic damage and fracture in argillaceous rocks.
- Validation and verification of the anisotropic model against laboratory experimental data and field observations on excavation damage zone at Mont Terri Underground Research Laboratory.

PUBLICATIONS

K. Kim, J. Rutqvist, J. Birkholzer (2019), "Lattice modeling of excavation damage in argillaceous clay formations: Influence of deformation and strength anisotropy," Tunnelling and Underground Space Technology incorporating Trenchless Technology Research, Article in Press.

K. Kim, J. Rutqvist, S. Nakagawa, J. Birkholzer (2017), "TOUGH–RBSN simulator for hydraulic fracture propagation within fractured media: Model validations against laboratory experiments," Computers & Geosciences, 108:72–85.

T. Ma, J. Rutqvist, W. Liu, L. Zhu, **K. Kim** (2017), "Modeling of CO_2 sequestration in coal seams: Role of CO_2-induced coal softening on injectivity, storage efficiency and caprock deformation," Greenhouse Gases: Science and Technology, 7(3): 562–578.

D. Asahina, K. Aoyagi, **K. Kim**, J. T. Birkholzer, J. E. Bolander (2017), "Elastically-homogeneous lattice models of damage in geomaterials," Computers and Geotechnics, 81:195–206.

K. Kim, J. Rutqvist, S. Nakagawa, J. Birkholzer (2017), "Discrete modeling of fluid-driven fracture processes in anisotropic rock formations," 51st US Rock Mechanics/Geomechanics Symposium, San Francisco, California, USA.

K. Kim, J. Rutqvist, S. Nakagawa, J. Houseworth, J. Birkholzer (2015), "Simulations of fluid-driven fracturing within discrete fracture networks using TOUGH-RBSN," TOUGH Symposium 2015, Berkeley, California, USA.