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EDUCATION

- 03/2006 – 08/2011 Doctor of Philosophy, Civil and Environmental Engineering, Yonsei University, Seoul, Korea
- Thesis: Development of Irregular Lattice Models for Simulating Rate Dependent Failure in Concrete Materials and Structures
- 03/2004 – 02/2006 Master of Science, Civil Engineering, Yonsei University, Seoul, Korea
- Thesis: Development and Application of Nonlinear Interface Link Element within a Three-Dimensional Random Lattice Model
- 03/1999 – 02/2004 Bachelor of Science in Engineering, Civil Engineering, Yonsei University, Seoul, Korea
- Capstone Design Project: Mixed Mode Fracture of Cementitious Materials

PROFESSIONAL EXPERIENCE

- 04/2019 – Present Project Scientist, Energy Geosciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
- 03/2014 – 03/2019 Postdoctoral Fellow, Energy Geosciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
- 12/2011 – 02/2014 Visiting Associate Researcher, Department of Civil and Environmental Engineering, University of California, Davis, CA, USA
- 09/2011 – 11/2011 Research Associate, Department of Civil and Environmental Engineering, Yonsei University, Seoul, Korea
- 03/2004 – 08/2011 Graduate Research Assistant, Department of Civil and Environmental Engineering, Yonsei University, Seoul, Korea

RESEARCH INTERESTS

Energy Geosciences and Geomechanics

- Development and application of coupled thermal-hydro-mechanical (THM) model for multi-component, multi-phase flow in geological media
- Simulation of hydraulic fracturing and its interaction with existing natural fractures using a discrete fracture network (DFN) approach
- Modeling of excavation damage zone (EDZ) evolution influenced by the strength and deformation anisotropy of rock formations

Structural Engineering and Mechanics

- Dynamic failure and damage analysis of structural concrete subject to high velocity impact and extreme loadings
- Deterioration of concrete structures due to steel bar corrosion and other durability issues
- Cracking performance in fiber-reinforced cement composites: discrete modeling of fiber-matrix interactions

RESEARCH GRANTS

- 10/2015 – 09/2016 Dynamic Fracture Simulation in Geomaterials at Multiple Length Scales
- Co-Principal Investigator
 - USD 196,000 for FY 2016 Laboratory Directed Research and Development (LDRD) Program at Lawrence Berkeley National Laboratory
- 10/2014 – 09/2015 Cracking the Earth: Thermal-Hydrological-Mechanical Modeling and Simulation of Fracture Propagation in Geomaterials
- Co-Principal Investigator
 - USD 175,000 for FY 2015 Laboratory Directed Research and Development (LDRD) Program at Lawrence Berkeley National Laboratory
- 12/2011 – 11/2012 Development of 3D Numerical Model for Simulating Rate Dependent Failure of Structures under Extremely Dynamic Loading
- Principal Investigator
 - KRW 30,000,000 (USD 27,300 approx.) for Support for Next-Generation Disciplines by National Research Foundation (NRF) of Korea
- 09/2004 – 02/2005 Development of Nonlinear Interfacial Link Element within Three-Dimensional Rigid-Body-Spring Networks
- Principal Investigator
 - USD 10,400 approx. for International Research Internship by the Korea Science and Engineering Foundation (KOSEF)

TEACHING EXPERIENCE

Department of Civil and Environmental Engineering, University of California, Davis, CA, USA

- 09/2012 – 12/2012 Co-Instructor for Laboratory Sessions of Sustainability of the Built Environment: Material Design (Undergraduate First-Year Seminar Course)

Department of Civil and Environmental Engineering, Yonsei University, Seoul, Korea

- 09/2011 – 11/2011 Teaching Assistant for Structural Stability (Graduate Course)
- 03/2010 – 06/2010 Teaching Assistant for Structural Stability (Graduate Course)
- 09/2008 – 12/2008 Teaching Assistant for Structural Stability (Graduate Course)
- 09/2006 – 12/2006 Teaching Assistant for Structural Stability (Graduate Course)
- 03/2005 – 06/2005 Teaching Assistant for Structural Dynamics (Undergraduate Course)

ACADEMIC AWARDS

- 03/2006 – 02/2010 Brain Korea 21 Fellowship, Korea Research Foundation
- 09/2004 – 02/2006 Graduate Research Fellowship, Yonsei University
- 03/2002 – 08/2003 Merit-based Scholarship, Yonsei University
- 09/1999 – 02/2001 Merit-based Scholarship, Yonsei University

PUBLICATIONS

Peer-Reviewed Scientific Journal Papers

1. **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.
2. T. Ma, J. Rutqvist, W. Liu, L. Zhu, **K. Kim** (2017), “Modeling of CO₂ sequestration in coal seams: Role of CO₂-induced coal softening on injectivity, storage efficiency and caprock deformation,” *Greenhouse Gases: Science and Technology*, 7(3): 562–578.
3. 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.
4. J. Kang, **K. Kim**, Y. M. Lim, J. E. Bolander (2014), “Modeling of fiber-reinforced cement composites: discrete representation of fiber pullout,” *International Journal of Solids and Structures*, 51:1970–1979.
5. D. Asahina, **K. Kim**, Z. Li, J. E. Bolander (2014), “Flow field calculations within discrete models of multiphase materials,” *Composites: Part B*, 58: 293–302.
6. **K. Kim**, J. E. Bolander, Y. M. Lim (2013), “Failure simulation of RC structures under highly dynamic conditions using random lattice models,” *Computers & Structures*, 125: 127–136.
7. **K. Kim**, J. E. Bolander, Y. M. Lim (2012), “Simulation of corroded RC structures using a three-dimensional irregular lattice model,” *Structural Engineering and Mechanics*, 41(5):645–662.
8. **K. Kim**, Y. M. Lim (2011), “Simulation of rate dependent fracture in concrete using an irregular lattice model,” *Cement and Concrete Composites*, 33(9): 949–955.
9. **K. Kim**, J. E. Bolander, Y. M. Lim (2011), “Rigid-Body-Spring Network with visco-plastic damage model for simulating rate dependent fracture of RC structures,” *Applied Mechanics and Materials*, 82: 259–265.
10. S. K. Shin, **K. Kim**, Y. M. Lim (2011), “Strengthening effects of DFRCC layers applied to RC flexural members,” *Cement and Concrete Composites*, 33(2):328–333.
11. **K. Kim**, J. M. Park, J. E. Bolander, Y. M. Lim (2010), “Simulation of cracking behavior induced by drying shrinkage in fiber reinforced concrete using irregular lattice model,” *KSCE Journal of Civil Engineering*, 30(4A):353–359 (in Korean).
12. **K. Kim**, J. Lim, J. Kim, Y. M. Lim (2008), “Simulation of material failure behavior under different loading rates using molecular dynamics,” *Structural Engineering and Mechanics*, 30(2): 177–190.
13. **K. Kim**, J. Lim, Y. M. Lim (2008), “Study on rate dependent fracture behavior of structures; Application to brittle materials using molecular dynamics,” *KSCE Journal of Civil Engineering*, 28(4A): 529–536 (in Korean).

Selected Conference/Workshop Proceedings

1. **K. Kim**, J. Rutqvist, J.F. Harrington, E. Tamayo-Mas, J.T. Birkholzer (2018), “Discrete Representation of Gas Migration and Fracture Processes in Compacted Bentonite Clay,” *TOUGH Symposium 2018, Berkeley, California, USA*. Accessed on October 8, 2018. [Online]. Available at https://drive.google.com/file/d/1VJo_yZArXK5EAK-9k6qDF0GRUUELVn4H/view.

2. E. Tamayo-Mas, J.F. Harrington, H. Shao, E.E. Dagher, J. Lee, **K. Kim**, J. Rutqvist, S.H. Lai, N. Chittenden, Y. Wang, I.P. Damians, S. Olivella (2018), "Numerical modelling of gas flow in a compact clay barrier for DECOVALEX-2019," *ARMA/DFNE 2018 Conference, Seattle, Washington, USA*. On USB flash drive.
3. D. Asahina, **K. Kim**, K. Tsusaka, M. Takeda (2017), "Modeling hydraulic fracture processes of geomaterials using 3D TOUGH-RBSN simulator," *The 15th International Conference of the International Association for Computer Methods and Advances in Geomechanics, Wuhan, China*. On USB flash drive.
4. **K. Kim**, J. Rutqvist, S. Nakagawa, J. Birkholzer (2017), "Discrete modeling of fluid-driven fracture processes in anisotropic rock formations," *ARMA 51st US Rock Mechanics/ Geomechanics Symposium, San Francisco, California, USA*. Accessed on September 15, 2018. [Online]. Available at <https://www.onepetro.org/conference-paper/ARMA-2017-0382>.
5. **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*. Accessed on September 15, 2018. [Online]. Available at https://tough.lbl.gov/assets/files/02/events/symposia/toughsymposium15/Proceedings_TOUGHSymposium2015.pdf.
6. Y. K. Hwang, **K. Kim**, J. E. Bolander, Y. M. Lim (2015), "Evaluation of rheological models within lattice-based simulations of concrete under dynamic loading," *Performance, Protection & Strengthening of Structures under Extreme Loading (PROTECT2015), East Lansing, MI, USA*, pp. 36–43.
7. J. E. Bolander, **K. Kim** (2014), "Controlling early-age temperature variations in concrete bridge decks," *4th International Symposium on Life-Cycle Civil Engineering (IALCCE2014), Tokyo, Japan*, pp. 470–476.
8. J. E. Bolander, **K. Kim**, K. Sasaki (2014), "Thermal effects on early-age cracking potential of concrete bridge decks," *Computational Modelling of Concrete and Concrete Structures (EURO-C 2014), St. Anton am Arlberg, Austria, Vol. 2*, pp. 723–730.
9. **K. Kim**, Y. M. Lim (2013), "Failure simulation of fiber reinforced concrete beams subjected to dynamic loadings," *8th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-8), Toledo, Spain*. On CD.
10. J. Bolander, **K. Kim**, J. Kang (2013), "Fiber pullout testing as a basis for fracture models of FRCC," *8th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-8), Toledo, Spain*. On CD.
11. **K. Kim**, Y. M. Lim (2011), "Rigid-Body-Spring Network with rheological model for simulating failure behavior of structural concrete under impact loading," *9th International Conference on Shock & Impact Loads on Structures (SI11)*. On CD.
12. **K. Kim**, J. E. Bolander, Y. M. Lim (2011), "Rigid-body-spring network with visco-plastic damage model for simulating rate dependent fracture of RC structures," *Performance, Protection & Strengthening of Structures under Extreme Loading (PROTECT2011), Lugano, Switzerland*, pp. 259–265.
13. **K. Kim**, Y. M. Lim, S. Choi, J. E. Bolander (2010), "Simulation of concrete fracture under different loading rates using rigid-body-spring networks," *7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-7), Jeju, Korea*. On CD.
14. **K. Kim**, J. M. Park, J. E. Bolander, Y. M. Lim (2009), "Fracture simulation with coupling moisture diffusion effect and external loading in fiber reinforced cementitious composites,"

15. **K. Kim**, S. Choi, S. K. Shin, Y. M. Lim (2009), “Rate dependent fracture simulation of concrete material using rigid-body-spring networks,” *International Conference on Computational Design in Engineering (CODE2009), Seoul, Korea*, pp. 62.
16. Y. M. Lim, **K. Kim**, S. Choi, K. Lee (2009), “Irregular lattice model for fracture behaviors of concrete materials under various impact loadings,” *Performance, Protection & Strengthening of Structures under Extreme Loading (PROTECT2009), Hayama, Japan*. On CD.
17. **K. Kim**, J. Lim, J. Kim, Y. M. Lim (2007), “Simulation of material failure behavior under different loading rates using molecular dynamics,” *9th US National Congress on Computational Mechanics (USNCCM9), San Francisco, USA*.
18. J. Kim, Y. M. Lim, **K. Kim** (2006), “Fracture behavior simulation using multi-scale analysis scheme under various thermal conditions,” *International Conference FGM IX (M&FGM 2006), Hawaii, USA*, pp. 100–105.

Technical/Scientific Reports

1. E. Tamayo-Mas, J.F. Harrington, H. Shao, E.E. Dagher, J. Lee, **K. Kim**, J. Rutqvist, S.H. Lai, N. Chittenden, Y. Wang, I.P. Damians, S. Olivella (2018), *DECOVALEX-2019 project: Task A - modElling Gas INjection ExpERiments (ENGINEER)*, BRITISH GEOLOGICAL SURVEY, Keyworth, Nottingham, UK, Open Report OR/18/00 (Minerals and Waste Programme).
2. L. Zheng, H. Deng, S. Nakagawa, **K. Kim**, T. Kneafsey, P. Dobson, S. Borglin, C. Doughty, M. Voltolini, C.-F. Tsang, B. Dessirier, Q. Wenning, C. Juhlin (2018), *Crystalline Disposal R&D at LBNL: FY18 Progress Report*, Lawrence Berkeley National Laboratory, Berkeley, CA, USA, LBNL-2001177 (U.S. Department of Energy Spent Fuel and Waste Science and Technology).
3. J. Rutqvist, **K. Kim**, H. Xu, Y. Guglielmi, J. Birkholzer (2018), *Investigation of Coupled Processes in Argillite Rock: FY18 Progress*, Lawrence Berkeley National Laboratory, Berkeley, CA, USA, LBNL-2001168 (U.S. Department of Energy Spent Fuel and Waste Science and Technology). Accessed on September 15, 2018. [Online]. Available at <https://escholarship.org/uc/item/5fd9r2kr>.
4. L. Zheng, J. Rutqvist, H. Xu, **K. Kim**, M. Voltolini, X. Cao (2017), *Investigation of Coupled Processes and Impact of High Temperature Limits in Argillite Rock: FY17 Progress*, Lawrence Berkeley National Laboratory, Berkeley, CA, USA, SFWD-SFWST-2017-000040 (U.S. Department of Energy Integrated Waste Management System). Accessed on September 15, 2018. [Online]. Available at <https://escholarship.org/uc/item/3xp586f6>.
5. C.F. Jové-Colón, G.E. Hammond, K.L. Kuhlman, L. Zheng, **K. Kim**, H. Xu, J. Rutqvist, F.A. Caporuscio, K.E. Norskog, J. Maner, S. Palaich, M. Cheshire, M. Zavarin, T.J. Wolery, C. Atkins-Duffin, J. Jerden, J.M. Copple, T. Cruse, W. Ebert (2016), *Evaluation of Used Fuel Disposition in Clay-Bearing Rock*, Sandia National Laboratories, Albuquerque, NM, USA, SAND2016-10311R (U.S. Department of Energy Used Fuel Disposition Campaign). Accessed on September 15, 2018. [Online]. Available at <https://www.osti.gov/biblio/1341730>.
6. L. Zheng, **K. Kim**, H. Xu, J. Rutqvist (2016), *DR Argillite Disposal R&D at LBNL*, Lawrence Berkeley National Laboratory, Berkeley, CA, USA, FCRD-UFD-2016-000437 (U.S. Department of Energy Used Fuel Disposition Campaign). Accessed on September 15, 2018. [Online]. Available at <https://escholarship.org/uc/item/80r9q6dm>.
7. S. Nakagawa, J. Rutqvist, T. Kneafsey, **K. Kim**, J. Birkholzer, H. Prieto (2016), *Phase 1 Final Report: Laboratory and Numerical Investigation of Hydraulic Fracture Propagation and*

Permeability Evolution in Heterogeneous and Anisotropic Shale, Lawrence Berkeley National Laboratory, Berkeley, CA, USA, FWP-ESD14084 (U.S. Department of Energy/National Energy Technology Laboratory Oil & Gas Program). Accessed on September 15, 2018. [Online]. Available at <https://www.netl.doe.gov/File%20Library/Research/Oil-Gas/FWP-ESD14084-Phase-1-Final-Report.pdf>.

8. C.F. Jové-Colón, P.F. Weck, G.E. Hammond, K.L. Kuhlman, L. Zheng, J. Rutqvist, **K. Kim**, J. Houseworth, F.A. Caporuscio, M. Cheshire, S. Palaich, K. Norskog, M. Zavarin, T.J. Wolery, J. Jerden, J. M. Copple, T. Cruse, W. Ebert (2015), *Evaluation of Used Fuel Disposition in Clay-Bearing Rock (Vol. I)*, Sandia National Laboratories, Albuquerque, NM, USA, SAND2015-7827R (U.S. Department of Energy Used Fuel Disposition Campaign). Accessed on September 15, 2018. [Online]. Available at <https://www.osti.gov/biblio/1346988>.
9. L. Zheng, J. Rutqvist, **K. Kim**, J. Houseworth (2015), *Investigation of Coupled Processes and Impact of High Temperature Limits in Argillite Rock*, Lawrence Berkeley National Laboratory, Berkeley, CA, USA, FCRD-UFD-2015-000362 (U.S. Department of Energy Used Fuel Disposition Campaign). Accessed on September 15, 2018. [Online]. Available at <https://escholarship.org/uc/item/1jg7f0gv>.
10. C.F. Jové-Colón, P.F. Weck, D.H. Sassani, L. Zheng, J. Rutqvist, C. Steefel, **K. Kim**, S. Nakagawa, J. Houseworth, J. Birkholzer, F.A. Caporuscio, M. Cheshire, M.S. Rearick, M.K. McCarney, M. Zavarin, A. Benedicto, A.B. Kersting, M. Sutton, J. Jerden, K.E. Frey, J.M. Copple, W. Ebert (2014), *Fuel Cycle Research and Development: Evaluation of Used Fuel Disposition in Clay-Bearing Rock*, Sandia National Laboratories, Albuquerque, NM, USA, SAND2014-18303R (U.S. Department of Energy Used Fuel Disposition Campaign). Accessed on September 15, 2018. [Online]. Available at <https://www.osti.gov/biblio/1164611>.
11. L. Zheng, J. Rutqvist, C. Steefel, **K. Kim**, F. Chen, V. Vilarrasa, S. Nakagawa, J. Houseworth, J. Birkholzer (2014), *Investigation of Coupled Processes and Impact of High Temperature Limits in Argillite Rock*, Lawrence Berkeley National Laboratory, Berkeley, CA, USA, FCRD-UFD-2014-000493 (U.S. Department of Energy Used Fuel Disposition Campaign). Accessed on September 15, 2018. [Online]. Available at <https://escholarship.org/uc/item/3tk2838d>.

PROFESSIONAL MEMBERSHIPS

- American Rock Mechanics Association (ARMA)
- American Geophysical Union (AGU)

PROFESSIONAL SERVICE

Journal Service

- Reviewer for *Cement and Concrete Composites* since 2013
- Reviewer for *Computers & Geosciences* since 2016
- Reviewer for *Engineering Geology* since 2017
- Reviewer for *Steel and Composite Structures, An International Journal* since 2017
- Reviewer for *Journal of Rock Mechanics and Geotechnical Engineering* since 2018
- Reviewer for *Rock Mechanics and Rock Engineering* since 2018
- Reviewer for *Geomechanics and Engineering, An International Journal* since 2018
- Reviewer for *International Journal of Rock Mechanics and Mining Sciences* since 2018