Yaneng Zhou

Assistant Professor - Research
Center for Geoinformatics
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Research Interests

- Geotechnical engineering and computational geomechanics
- Rock mechanics, fracture mechanics and damage mechanics
- Reservoir geomechanics and poromechanics
- Rock cutting, frictional contact and subsidence

Education

2009–2013	**Ph.D.** in Civil Engineering, University of Pittsburgh Dissertation: Numerical modeling of rock drilling with finite elements
2006–2009	**M.S.** in Hydraulic Engineering, Tsinghua University, China Specialization: Rock mechanics
2002–2006	**B.S.** in Hydraulic Engineering, Wuhan University, China Graduated with honors

Current Position

07/2020–Present	**Assistant Professor - Research**, Center for Geoinformatics, Department of Civil and Environmental Engineering, Louisiana State University

Research Experience

12/2016–06/2020	**Postdoctoral Researcher**, Louisiana State University Research topics: Subsidence and frictional contact
11/2014–12/2016	**Postdoctoral Scholar**, Pennsylvania State University Research topics: Geomechanical stress model and rock fracture
09/2013–10/2014	**Postdoctoral Associate**, University of Minnesota Research topic: Mechanics of a blunt cutter

Teaching and Mentoring Experience

12/2016–Present	**Mentor**, Louisiana State University Mentor graduate students in finite element modeling
11/2014–06/2015	**Mentor**, Pennsylvania State University Mentored a visiting doctoral student in modeling rock fracture
09/2014–10/2014	**Teaching Assistant**, Soil Mechanics, University of Minnesota

	Held regular office hours and answered students' questions
09/2009–12/2012	**Teaching Assistant**, Soil Mechanics, University of Pittsburgh Taught laboratory sessions of Soil Mechanics for four semesters
05/2012–08/2012	**Teaching Assistant**, Foundation Engineering, University of Pittsburgh Held regular office hours and graded homework
09/2008–06/2009	**Mentor**, Tsinghua University, China Mentored two undergraduate students in modeling the stability of dams

Journal Publications

1. **Zhou Y** and Voyiadjis GZ. Computational modeling of tool-rock frictional contact with anisotropic damage. *Rock Mechanics and Rock Engineering.* 2022, submitted.
2. Voyiadjis GZ, **Zhou Y** and Peter IK. A new anisotropic elasto-plastic-damage model for quasi-brittle materials using strain energy equivalence. *Mechanics of Materials*, 2022; 165, 104163.
3. **Zhou Y** and Voyiadjis GZ. Rate effect in frictional contact on porous rocks. *Rock Mechanics and Rock Engineering*, 2021; 54(3), 1411–1430.
4. Voyiadjis GZ and **Zhou Y**. Numerical modeling of frictional contact between a blunt tool and quasi-brittle rock. *Rock Mechanics and Rock Engineering*, 2019; 52(10): 3771–3790.
5. **Zhou Y** and Voyiadjis GZ. Finite element modeling of production-induced compaction and subsidence in a reservoir along coastal Louisiana. *Journal of Coastal Research*, 2019; 35(3): 600–614.
6. **Zhou Y**, Nikoosokhan S, Tan Y, Johnston T and Engelder T. The correlation between low tectonic stress and the Appalachian Basin Quiet Zone. *Tectonophysics*, 2018; 745: 95–116.
7. Voyiadjis GZ and **Zhou Y**. Time-dependent modeling of subsidence due to drainage in bounding shales: Application to a depleted gas field in Louisiana. *Journal of Petroleum Science and Engineering*, 2018; 166: 175–187.
8. **Zhou Y**, Zhang W, Gamwo IK and Lin J-S. Mechanical specific energy versus depth of cut in rock cutting and drilling. *International Journal of Rock Mechanics and Mining Sciences*, 2017; 100: 287–297.
9. **Zhou Y**, Nikoosokhan S and Engelder T. Sonic properties as a signature of overpressure in the Marcellus gas shale of the Appalachian Basin. *Geophysics*, 2017; 82(4): D235–D249.
10. **Zhou Y**. Misinterpretation of friction as fracture in shallow scratch tests with classical and universal size effect laws. *Engineering Fracture Mechanics*, 2017; 184: 14–21.
11. **Zhou Y**. Discussion on the interpretation of scratch tests with size effect law. *Engineering Fracture Mechanics*, 2017; 169: 178–183.
12. **Zhou Y**. The applicability of correspondence rule with inclined load. *Rock Mechanics and Rock Engineering*, 2017; 50(1): 233–240.

13. **Zhou Y**, Reese L, Qiu T and Rado Z. Field test and numerical modeling of vehicle impact on a boulder with impact-induced fractures. *International Journal of Protective Structures*, 2016; 7(1): 3–17.

14. Jaime MC, **Zhou Y**, Lin J-S and Gamwo IK. Finite element modeling of rock cutting and its fragmentation process. *International Journal of Rock Mechanics and Mining Sciences*, 2015; 80: 137–146.

15. Lin J-S and **Zhou Y**. Rebuttal: Shallow wide groove scratch tests do not give fracture toughness. *Engineering Fracture Mechanics*, 2015; 133: 211–222.

16. **Zhou Y** and Lin J-S. Modeling the ductile-brittle failure mode transition in rock cutting. *Engineering Fracture Mechanics*, 2014; 127: 135–147.

17. Lin J-S and **Zhou Y**. Can scratch tests give fracture toughness? *Engineering Fracture Mechanics*, 2013; 109: 161–168.

18. **Zhou Y** and Lin J-S. On the critical failure mode transition depth for rock cutting. *International Journal of Rock Mechanics and Mining Sciences*, 2013; 62: 131–137.

19. Lin P, **Zhou Y**, Liu H and Wang C. Reinforcement design and stability analysis for large-span tailrace bifurcated tunnels with irregular geometry. *Tunnelling and Underground Space Technology*, 2013; 38: 189–204.

Conference Publications

Conference Papers

1. **Zhou Y** and Detournay E. Analysis of the contact forces on a blunt PDC bit. *48th US Rock Mechanics/Geomechanics Symposium*, Minneapolis, MN, 2014.

2. **Zhou Y** and Lin J-S. Numerical modeling of rock drilling with finite elements. *3rd International Colloquium on Nonlinear Dynamics and Control of Deep Drilling Systems*, Minneapolis, MN, 2014.

3. **Zhou Y** and Lin J-S. Modeling the fracture of quasibrittle materials: A comparative study. *47th US Rock Mechanics/Geomechanics Symposium*, San Francisco, CA, 2013.

4. **Zhou Y**, Zhang W, Gamwo IK, Lin J-S, Eastman H, Gill M and Whipple G. Mechanical specific energy of drilling versus depth of cut. *46th US Rock Mechanics/Geomechanics Symposium*, Chicago, IL, 2012.

5. **Zhou Y**, Jaime MC, Gamwo IK, Zhang W and Lin J-S. Modeling groove cutting in rocks using finite elements. *45th US Rock Mechanics/Geomechanics Symposium*, San Francisco, CA, 2011.

6. Lin J-S, Mendoza JA, Jaime MC, **Zhou Y**, Gamwo IK and Zhang W. Numerical modeling of rock cutting. *12th ISRM International Congress on Rock Mechanics*, Beijing, China, 2011.

Conference Abstracts and Presentations

1. **Zhou Y** and Voyiadjis GZ. Finite element modeling of damage in frictional contact between a

blunt tool and quasi-brittle rock. *4th International Conference on Damage Mechanics*, Baton Rouge, LA, 2023, accepted.

2. **Zhou Y** and Voyiadjis GZ. Numerical modeling of tool-rock frictional contact with anisotropic damage. *ASME 2022 International Mechanical Engineering Congress and Exposition*, Columbus, OH, 2022, accepted.

3. Voyiadjis GZ, **Zhou Y** and Peter IK. Anisotropic elasto-plastic-damage model for quasi-brittle materials with strain energy equivalence. *AGU Fall Meeting*, Chicago, IL, 2022, accepted.

4. Voyiadjis GZ, **Zhou Y** and Peter IK. A new anisotropic elasto-plastic-damage model for quasi-brittle materials using strain energy equivalence. *Engineering Mechanics Institute Conference*, Baltimore, MD, 2022.

5. **Zhou Y** and Voyiadjis GZ. Rate effect in frictional contact on porous rocks. *The Biot-Bažant Conference on Engineering Mechanics and Physics of Porous Materials*, Chicago, IL, 2021.

6. Voyiadjis GZ and **Zhou Y**. Computational modeling of tool-rock frictional contact on quasi-brittle and poroplastic rocks. *Engineering Mechanics Institute Conference*, New York, NY, 2021.

7. **Zhou Y** and Voyiadjis GZ. Numerical modeling of rate effects in tool-rock frictional contact. *AGU Fall Meeting*, San Francisco, CA, 2019.

8. **Zhou Y** and Voyiadjis GZ. Numerical modeling of frictional contact between a blunt tool and quasi-brittle rock. *Engineering Mechanics Institute Conference*, Pasadena, CA, 2019.

9. Voyiadjis GZ and **Zhou Y**. Numerical modeling of frictional contact between a blunt tool and quasi-brittle rock. *AGU Fall Meeting*, Washington, DC, 2018.

10. Voyiadjis GZ and **Zhou Y**. Time-dependent modeling of subsidence due to drainage in bounding shales: Application to a depleted gas field in Louisiana. *Louisiana Coastal Geology Symposium*, Baton Rouge, LA, 2018.

11. Voyiadjis GZ and **Zhou Y**. Numerical modeling of time-dependent subsidence in a gas field in coastal Louisiana. *18th US National Congress on Theoretical and Applied Mechanics*, Chicago, IL, 2018.

12. **Zhou Y** and Voyiadjis GZ. Numerical modeling of elastoplastic reservoir compaction and land subsidence in a gas field in coastal Louisiana. *Engineering Mechanics Institute Conference*, Boston, MA, 2018.

13. **Zhou Y** and Voyiadjis GZ. Numerical modeling of subsidence induced by hydrocarbon production in a reservoir in coastal Louisiana. *AGU Fall Meeting*, New Orleans, LA, 2017.

14. **Zhou Y** and Voyiadjis GZ. Numerical modeling of subsidence induced by hydrocarbon production in southern Louisiana. *Engineering Mechanics Institute Conference*, San Diego, CA, 2017.

15. **Zhou Y**, Nikoosokhan S and Engelder T. Sonic properties as a signature of overpressure in the Marcellus gas shale of the Appalachian Basin. *AAPG Annual Convention and Exhibition*, Houston, TX, 2017.

16. Engelder T and **Zhou Y**. A review of the leading technologies that can make a difference in the search for and production of hydrocarbons. *SPE/AAPG Africa Energy and Technology Conference*, Narobi, Kenya, 2016.

17. **Zhou Y**, Nikoosokhan S and Engelder T. A geomechanical model for gas shales based on the integration of stress measurements and petrophysical data from the greater Marcellus gas system. *RPSEA Onshore Technology Workshop*, Canonsburg, PA, 2016.

18. **Zhou Y**, Lin J-S and Gamwo IK. On the relationship between mechanical specific energy and rate of penetration. *AIChE Annual Meeting*, Pittsburgh, PA, 2012.

19. Lin J-S, **Zhou Y**, Gamwo IK, Kabir AM and Brown JL. Modeling the mechanics of drilling bit. *AIChE Annual Meeting*, Minneapolis, MN, 2011.

Edited Proceedings

1. Detournay E, Denoël V, van de Wouw N and **Zhou Y** (eds.). Nonlinear dynamics and control of deep drilling systems. *Proceedings of the 3rd International Colloquium on Nonlinear Dynamics and Control of Deep Drilling Systems*, University of Minnesota, Minneapolis, MN, 2014.

Book Chapters

1. Voyiadjis GZ and **Zhou Y**. Frictional contact between a blunt tool and quasi-brittle rock with damage: Numerical modeling. In Voyiadjis GZ (ed.), *Handbook of Damage Mechanics: Nano to Macro Scale for Materials and Structures*, Springer, 2022.

Technical Reports

1. Engelder T, Johnston T, Nikoosokhan S, Tan Y and **Zhou Y**. A geomechanical model for gas shales based on the integration of stress measurements and petrophysical data from the greater Marcellus gas system. *Final Report of RPSEA Project 09122–32*, The Pennsylvania State University, University Park, PA, 2016.

2. Engelder T, **Zhou Y** and Nikoosokhan S. Appalachian Basin stress calculator user manual. *User Manual of RPSEA Project 09122–32*, The Pennsylvania State University, University Park, PA, 2016.

Professional Memberships

- American Geophysical Union (AGU)
- American Rock Mechanics Association (ARMA)
- Engineering Mechanics Institute (EMI)

Service

Secretariat

- The 4th International Conference on Damage Mechanics (Chaired by Voyiadjis GZ), Louisiana State University, Baton Rouge, LA, 2023.

Organizing Committee Member

- The 3rd International Colloquium on Nonlinear Dynamics and Control of Deep Drilling Systems (Chaired by Detournay E), University of Minnesota, Minneapolis, MN, 2014.

Session Chair

- Multiscale Behavior of Damage and Failure Mechanics, Engineering Mechanics Institute Conference, Baltimore, MD, 2022.

Reviewer

- AAPG Bulletin
- Bulletin of Engineering Geology and the Environment
- Engineering Fracture Mechanics
- Geofluids
- Geophysics
- Geotechnical Testing Journal
- International Journal of Geotechnical Engineering
- International Journal of Rock Mechanics and Mining Sciences
- Journal of Engineering Mechanics
- Journal of Geotechnical and Geoenvironmental Engineering
- Multidiscipline Modeling in Materials and Structures
- Rock Mechanics and Rock Engineering
- Scientific Reports
- SPE Journal
- Tunnelling and Underground Space Technology
- Wear