

# Rakesh J. Pillai

---

Associate Professor  
Civil Engineering  
Indian Institute of Technology Palakkad  
Palakkad  
Kerala, 678623  
Phone: +91 491 209 1113



Email: [rakeshpilla@iitpkd.ac.in](mailto:rakeshpilla@iitpkd.ac.in), [rakeshpilla@gmail.com](mailto:rakeshpilla@gmail.com)

## Education

| Degree                      | Institute                             | Year of Graduation |
|-----------------------------|---------------------------------------|--------------------|
| Ph.D in Civil Engineering   | Indian Institute of Technology Madras | 2012               |
| B.Tech in Civil Engineering | Mahatma Gandhi University, Kerala     | 2005               |

## PhD Dissertation

**Effect of microfabric on static and cyclic behavior of clays**

*Supervisors: Prof. R. G. Robinson, Prof. A. Boominathan,  
Department of Civil Engg., IIT Madras*

## Experience

| Position            | Institute                                  | Duration               |
|---------------------|--|------------------------|
| Project Officer     | Nanyang Technological University Singapore | Sep 2012 - Oct 2013    |
| Assistant Professor | National Institute of Technology Warangal  | Dec 2013 - June 2019   |
| Assistant Professor | Indian Institute of Technology Palakkad    | July 2019 - June 2023  |
| Associate Professor | Indian Institute of Technology Palakkad    | June 2023 - Continuing |

## Research Interests

Cyclic behavior of soil, Constitutive modeling of soils, Numerical modeling of landslide run-out, Behavior of stabilized soil

## Peer-Reviewed Journal Articles

1. **Rakesh J Pillai, R G Robinson and A Boominathan**, (2011). Effect of microfabric on undrained static and cyclic behavior of kaolin clay. *Journal of Geotechnical and Geoenvironmental Engineering*, 137(4), 421 - 429.
2. **Rakesh J Pillai, Bushra I and R G Robinson**, (2012). Undrained triaxial behaviour of cement treated marine clay. *Geotechnical and Geological Engineering*, DOI 10.1007/s10706-012-9605-3.
3. **Rakesh J Pillai, K M Nazeem and R G Robinson**, (2013). Post-cyclic behavior of clayey soil. *Indian Geotechnical Journal*, DOI 10.1007/s40098-013-0042-x.
4. **Lini Dev K, Rakesh J Pillai and R G Robinson**, (2013). Estimation of critical state parameters from one dimensional consolidation and triaxial compression tests, *Indian Geotechnical Journal*, DOI 10.1007/s40098-013-0063-5.
5. **Rakesh J Pillai, R G Robinson and A Boominathan**, (2014). Undrained and drained shearing behavior of kaolinite with different microfabric, *International Journal of Geotechnical Engineering*, 8(1):10 - 20.
6. **Lini Dev K, Rakesh J Pillai and R G Robinson**, (2016). Drained angle of internal friction from direct shear and triaxial compression tests. *International Journal of Geotechnical Engineering*, DOI 10.1080/19386362.2015.1133754.
7. **P Hari Prasad Reddy, C H Rama Vara Prasad and Rakesh J Pillai**, (2017). Swelling of natural soil subjected to acidic and alkaline contamination *Periodica Polytechnica Civil Engineering*, DOI: 10.3311/PPci.8185, pp:1-10.
8. **C H Rama Vara Prasad, S K Vindula, P Hari Prasad Reddy, Ambili Babu and Rakesh J Pillai**, (2017). Swelling behaviour of kaolinitic clays contaminated with alkali solutions: A micro-level study. *Applied Clay Science*, 135: 575 - 582.
9. **Venkatesh N, Heeralal M and Rakesh J Pillai** (2018). Resilient Modulus of Clayey Subgrade Soils Treated with Calcium Carbide Residue. *International Journal of Geotechnical Engineering*, DOI: 10.1080/19386362.2018.1512230
10. **Venkatesh N, Heeralal M and Rakesh J Pillai** (2018). Multiscale laboratory investigation on black cotton soils stabilized with calcium carbide residue and fly ash. *Journal of Engineering Research*, Vol 6(4), 1-15.
11. **Venkatesh N, Heeralal M, Rakesh J Pillai and Sudheer Kumar Y** (2019). Permanent deformation behaviour of black cotton soil treated with calcium carbide residue. *Construction and Building Materials*, Vol 223, 441-449.
12. **Venkatesh N, Heeralal M and Rakesh J Pillai** (2020). Resilient and Permanent deformation behaviour of clayey subgrade soil subjected to repeated load triaxial tests. *European Journal of Environmental and Civil Engineering*, 24 (9), 1414-1429.
13. **V Bhavita Chowdary, V Ramana Murthy and Rakesh J Pillai** (2020). Fiber reinforced geopolymer treated soft clay An innovative and sustainable alternative for soil stabilization. *Materials Today: Proceedings*, DOI: 10.1016/j.matpr.2020.03.574
14. **V Bhavita Chowdary, V Ramana Murthy and Rakesh J Pillai** (2020). Experimental evaluation of strength and durability characteristics of geopolymer stabilised soft soil for deep mixing applications. *Innovative Infrastructure Solutions*, Vol 6(1), 1-10.

15. **Kavinkumar C, Sureka S, Rakesh J Pillai and Heeralal M**(2021). Influence of erodible layer on granular column collapse using discrete element analysis. *Geomechanics and Geoengineering*, DOI: 10.1080/17486025.2021.1928759.
16. **V Bhavita Chowdary, V Ramana Murty and Rakesh J Pillai** (2022). Efficacy of Slag-Based Geopolymer Binder Reinforced with Polypropylene Fibers in the Stabilization of Soft Clays. *Transportation Infrastructure Geotechnology*, DOI: 10.1007/s40515-022-00256-0.
17. **Abhijith A, Anto Francis K and Rakesh J Pillai** (2023). Anthropogenic Slope Modification for Plantations Leading to Rainfall-Induced Landslides: An Evaluation Based on Pore Pressure Variation and Slope Stability. *Geomorphology*, DOI: 10.1016/j.geomorph.2024.109081.
18. **Abhijith A, and Rakesh J Pillai** (2024). TRIGRS-FOSM: Probabilistic Slope Stability Tool for Rainfall Induced Landslide Susceptibility Assessment. *Natural Hazards*, DOI: 10.1007/s11069-024-06933-2.
19. **Abhijith A, Kavinkumar C and Rakesh J Pillai** (2025). Uncertainties and Spatial Variability in Slope Stability and Landslide Runout Analysis. *Indian Geotechnical Journal*, DOI:10.1007/s40098-025-01326-z.
20. **Abhijith A, Smitha S, Anto Francis K and Rakesh J Pillai** (2025). A Novel DEM Enhancement Methodology to Improve Physics-Based Susceptibility Modeling of Rainfall-Induced Landslide along Anthropogenically Modified Slopes. *Canadian Geotechnical Journal*, DOI:10.1139/cgj-2025-008.

## Book Chapters

1. **Rakesh J Pillai, R G Robinson and A Boominathan** (2007). Behavior of kaolinite clays under cyclic loading, *In: R. Ayothiraman and Hemanta Hazarika (eds.) Earthquake Hazards and Mitigation*, I.K. International Publishing House, New Delhi, 409-414.
2. **Raghu P and Pillai R J** (2019). Behaviour thresholds of quarry dust-bentonite mixes, *In: Stalin V., Muttharam M. (eds) Geotechnical Characterisation and Geoenvironmental Engineering. Lecture Notes in Civil Engineering*, Vol 16. Springer, Singapore, 235-241.
3. **Bandyopadhyay P, and Pillai R J** (2020) A bounding surface model for cement stabilized clay, *In: Latha Gali M., P. R.R. (eds) Geotechnical Characterization and Modelling. Lecture Notes in Civil Engineering*, vol 85. Springer, Singapore, 1005-1018.
4. **Venkatesh N, Ali D., Pillai R J and Heeralal M** (2021) Strength and durability characteristics of lime stabilized black cotton soil, *In: Latha Gali M., Raghuveer Rao P. (eds) Problematic Soils and Geoenvironmental Concerns. Lecture Notes in Civil Engineering*, vol 88. Springer, Singapore, 739-750.
5. **Mahesh L, Pillai R J, Kumar G S, and Murty V R** (2021) Improvement of soft clay bed using fibre reinforced soil-cement columns, *In: Latha Gali M., Raghuveer Rao P. (eds) Problematic Soils and Geoenvironmental Concerns. Lecture Notes in Civil Engineering*, vol 88. Springer, Singapore, 697-710.
6. **Sumanth Kumar G, Ramana Murty V, Mahesh L and Rakesh Pillai J** (2021) Influence of soil-cement columns on load-deformation behaviour of soft clay, *In: Latha Gali M., Raghuveer Rao P. (eds) Problematic Soils and Geoenvironmental Concerns. Lecture Notes in Civil Engineering*, vol 88. Springer, Singapore, 711-721.

## Conference Proceedings

1. **Rakesh J Pillai, R G Robinson and A Boominathan** A study of the effect of structure on engineering behavior of kaolinite, *Proceedings of National Conference on Foundations and Earth Retaining Structures*, Roorkee, 2007.
2. **Rakesh J Pillai, R G Robinson and A Boominathan** Behavior of kaolinite clays under cyclic loading, *Proceedings of International Workshop on Earthquake Hazards and Mitigation*, Guwahati, India, May 2007
3. **Rakesh J Pillai, R G Robinson and A Boominathan** Shear strength behavior of kaolinite with different microfabric, *Proceedings of Indian Geotechnical Conference (IGS 2010)*, Mumbai, 2010.
4. **Rakesh J Pillai, R G Robinson and A Boominathan** Effect of inherent anisotropy on the undrained behaviour of clays, *Proceedings of International Conference on Modelling and Simulations in Civil Engineering*, Kollam, Kerala, India, December 2013
5. **G Gnana Prasanna and Rakesh J Pillai** Influence of waste plastic strips on engineering behavior of soils, *Proceedings of Indian Geotechnical Conference (IGS 2014)*, Kakinada, 2014.
6. **Partha Das and Rakesh J Pillai** Influence of waste tyre chips on the strength and deformation characteristics of silty and clayey sand, *Proceedings of Indian Geotechnical Conference (IGS 2014)*, Kakinada, 2014.
7. **C H Rama Vara Prasad, P Hari Prasad Reddy, Rakesh J Pillai and Vineet Kumar** Effect of Acids on Swell Potential of Black Cotton Soil *International Geotechnical Symposium on Disaster Mitigation in Special Geoenvironmental Conditions (6IGS)*, Chennai, January 2015.
8. **Sabari Ramesh, Rakesh J Pillai and Anu Maria Antony** Analysis of rain induced slope failures using combined hydrological geotechnical model, *Proceedings of Indian Geotechnical Conference (IGS 2015)*, Pune, 2015.
9. **Ambili Babu, C H Rama Vara Prasad, P Hari Prasad Reddy, Rakesh J Pillai and Sai Kumar V** Measure to control alkali induced heave in kaolinitic soils using fly ash, *Proceedings of Indian Geotechnical Conference (IGS 2015)*, Pune, 2015.
10. **Venkatesh N, Heeralal M and Rakesh J Pillai** Effect of water content and stress levels on resilient modulus of subgrade soil, *First International Conference on Recent Innovations in Engineering and Technology*, Hyderabad, December 2016
11. **Pradeep Raghu and Rakesh J Pillai** Behaviour thresholds of quarry dust-bentonite mixes, *Proceedings of Indian Geotechnical Conference (IGS 2016)*, Chennai, 2016.
12. **Sunita Behera, V Ramana Murty and Rakesh J Pillai** Numerical analysis of 44m high MSE wall at Kanagadurga temple, Vijayawada using PLAXIS 3D, *Proceedings of Indian Geotechnical Conference (IGS 2016)*, Chennai, 2016.
13. **Venkatesh N, Athira Gopinath, Heeralal M and Rakesh J Pillai** Influence of moisture content and stress levels on the permanent deformation behaviour of cohesive subgrade soil, *Proceedings of Indian Geotechnical Conference (IGS 2016)*, Chennai, 2016.
14. **Sumanth Kumar G, V Ramana Murty, Mahesh L and Rakesh J Pillai** Influence of soil-cement columns on load-deformation behaviour of soft clay, *Proceedings of Indian Geotechnical Conference (IGS 2018)*, Bangalore, 2018.

15. **Mahesh L, Sumanth Kumar G, Rakesh J Pillai and V Ramana Murty** Improvement of soft clay bed using fibre reinforced soil-cement columns, *Proceedings of Indian Geotechnical Conference (IGS 2018)*, Bangalore, 2018.
16. **Paromeeta B and Rakesh J Pillai** A bounding surface model for cement stabilized clay, *Proceedings of Indian Geotechnical Conference (IGS 2018)*, Bangalore, 2018.
17. **Venkatesh N, Danish Ali, Rakesh J Pillai and Heeralal M** Strength and durability characteristics of lime stabilized black cotton soil, *Proceedings of Indian Geotechnical Conference (IGS 2018)*, Bangalore, 2018.
18. **V Bhavita Chowdary, Aravind G, V Ramana Murty and Rakesh J Pillai** Geopolymer stabilization of soft clays - an emerging technique, *Proceedings of Indian Geotechnical Conference (IGS 2019)*, GeoINDUS, Surat, 2019.
19. **Kavinkumar C, Sureka S and Rakesh J Pillai** Study of dry granular flow behavior with and without erodible layer, *Proceedings of Indian Geotechnical Conference (IGS 2020)*, Visakhapatnam, 2020.
20. **Balaji Bandaru and Rakesh J Pillai** Viscoplastic modelling of soft sensitive soil, *Proceedings of Eight Indian Young Geotechnical Engineers Conference (8IYGEC 2021)*, Chennai, 2021.
21. **Abhijith Ajith, Anupriya Singh and Rakesh J Pillai** Spatial Prediction of Landslide Susceptibility using Probabilistic Slope Stability Analysis, *Proceedings of Second National Conference on Resilient Infrastructure (NCRI 2022)*, Thiruvananthapuram, 2022.
22. **Abhijith Ajith, Anupriya Singh and Rakesh J Pillai** Comparative Studies on Spatial Prediction Models of Rainfall Induced Landslide, *Proceedings of Indian Geotechnical Conference (IGC 2022)*, Kochi, 2022.
23. **Bikram Ray, Abhijith Ajith and Rakesh J Pillai** Multi-phase Landslide Runout Modelling of Rainfall Induced Debris Flow Events in the Western Ghats, *Proceedings of Indian Geotechnical Conference (IGC 2023)*, Roorkee, 2023.
24. **Meghna V S and Rakesh J Pillai** Geopolymers for Soft Clay Stabilization: A Review, *Proceedings of Women Indian Geotechnical Conference, WIGC*, Chennai, 2024
25. **Milind Amin and Rakesh J Pillai** A Comprehensive Overview of Recent Advances in Constitutive Modeling of Cement Treated Soils, *Proceedings of Women Indian Geotechnical Conference, WIGC*, Chennai, 2024
26. **Sreelakshmi K S, Meghna V S and Rakesh J Pillai** Effect of Spatial Variability on the Strength Characteristics of Deep Cement Mixed Column Improved Ground, *Proceedings of Indian Geotechnical Conference, IGC*, Aurangabad, 2024
27. **Abhijith Ajith, Amritanshu Raj and Rakesh J Pillai** Analysing Features Influencing Debris Flow Path using Different Machine Learning Techniques, *Proceedings of Indian Geotechnical Conference, IGC*, Aurangabad, 2024
28. **Pranoy S, Abhijith Ajith, Sabari Ramesh, Rakesh J Pillai, and Maneesha V Ramesh** Development and Validation of a Multi-Phase Debris Flow Model, *Proceedings of International Conference on Water, Environment, Energy & Society*, Puduchery, 2025
29. **Abhijith Ajith, Bhawesh Kumar and Rakesh J Pillai** Integrating Random FEM and CNN for Efficient Slope Stability Analysis with Spatially Variable Soil Properties, *International Conference on Geotechnical Research and Engineering*, Barcelona, 2025
30. **Milind Amin and Rakesh J Pillai** Constitutive Model for Cement-Soil Based on a Dynamical Systems Approach under Monotonic Loading, *International Conference on Geotechnical Research and Engineering*, Barcelona, 2025

## Research Experience

Worked as project officer in School of Civil and Environmental Engineering, Nanyang Technological University, Singapore (September 2012 - October 2013).

- **Project:** Feasibility study of underground cavern construction for Underground Science City in Singapore
- Work involved:
  - ◇ Assess the major geologic risks involved in the construction of cavern network
  - ◇ Carry out finite element simulations of tunnelling through rock formations

## Teaching Experience

- Assistant Professor, Department of Civil Engineering, NIT Warangal, Telangana (December 2013 - June 2019)

## PhD & M.Tech Guidance

|        | Completed | On-Going |
|--------|-----------|----------|
| PhD    | 3         | 4        |
| M.Tech | 36        | 3        |

## Topics of Research - PhD Guidance

1. Studies on resilient and permanent deformation behaviour of flexible pavement layers
2. Application of geopolymer soil columns for soft ground improvement
3. Numerical Modelling of landslide run out and debris flow
4. Probabilistic slope stability analysis and landslide susceptibility
5. Behaviour of very soft clays and ground improvement
6. Constitutive Modelling of cemented clays

## Courses Taught (at NIT Warangal)

- **B. Tech - Civil Engineering**
  - ◇ Building Planning and Construction (IV Semester, Core course)
  - ◇ Building Technology (VIII Semester, Open Elective)
  - ◇ Ground Improvement Techniques (VIII Semester, Departmental Elective)
- **M. Tech - Geotechnical Engineering**
  - ◇ Computational Methods in Geotechnical Engineering (I Semester, Elective)
  - ◇ Earthquake Geotechniques (II Semester, Elective)
  - ◇ Design with Geosynthetics (II Semester, Elective)

## Courses Taught (at IIT Palakkad)

- **B. Tech - Civil Engineering**

- ◇ Building Drawing (III Semester, Core course)
- ◇ Geology and Soil Mechanics (IV Semester, Core course)
- ◇ Geotechnical Engineering (V Semester, Core course)

- **M. Tech - Geotechnical Engineering**

- ◇ Soil Dynamics and Earthquake Engineering (I Semester, Elective)
- ◇ Finite Element Method in Geotechnical Engineering (II Semester, Elective)
- ◇ Applied Soil Mechanics (II Semester, Core)