Dr. LIJITH K P

PhD, Geotechnical Engineering
Assistant Professor
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EDUCATION

Doctor of Philosophy (Ph.D.) in Geotechnical Engineering
IIT Bombay, Mumbai, India, 2017 – 2022, CGPA- 10/10

Master of Technology (M. Tech.) in Geotechnical Engineering
IIT Madras, Chennai, India, 2015 – 2017, CGPA- 9.34/10

Bachelor of Technology (B. Tech.) in Civil Engineering
NIT Calicut, Calicut, Kerala, India, 2011– 2015, CGPA- 8.79/10

WORK EXPERIENCE

Assistant Professor, Dept. of Civil Engineering, IIT(ISM) Dhanbad, India, 2025 May – Present.
Postdoctoral Associate, Dept. of Civil Engineering, University of Calgary, Alberta, Canada, 2023 May – 2025 April.
Project Officer, Subsurface mechanics and Geo-energy Lab, Dept. of Civil Eng., IIT Chennai, India, 2023 Jan – 2023 March.

AWARDS/SCHOLARSHIPS

Received the Award for the best M. Tech. outgoing student in Geotechnical Engineering for the year 2017 from IIT Chennai.
GATE Scholarship of Ministry of Human Resource Development, India for post-graduate studies, 2015-2017.

PROJECTS HANDLED

1. Assessing the influence of climate change-induced hydrate dissociation on the stability of slopes in the Arctic Ocean. University of Calgary, AB, Canada, 2023 May – 2025 April.
2. Evaluation of spatial distribution of methane gas hydrates in sediments, their influence on geotechnical properties, geomechanical properties, and geomechanical modelling for sea floor stability. A collaborative project between Oil and Natural Gas Corporation (ONGC) of India and IIT Bombay. IIT Bombay, India, 2017 July – 2022 Aug.
3. Investigations on drill fluid migration through porous media. IIT Madras, Chennai, India, 2023 Jan – 2023 March.
4. Characterization of Raigad fort samples, Maharashtra, India, 2021 Jan.
5. Investigations on Municipal solid waste from Gorai landfill, Mumbai, India, 2021 Jan.
6. Characterisation of the dredged material from Mumbai Port Trust, Mumbai, India, 2021 May.

SKILLS

- FLAC 3D, TOUGH, PLAXIS 2D, AUTO CAD.
- Python programming to interact with FLAC 3D.
- Microsoft office suite, Microsoft Visio.
- Geotechnical testing systems (Wille, GCTS, Humboldt, VJ Tech) and data acquisition systems (NI LabView, Picolog).

THESIS

- Investigations on thermo-hydro-mechanical characteristics of gas hydrate bearing sediments (Ph.D. Thesis, IIT Bombay).
- Engineering properties of soils from multistage triaxial testing (M. Tech. Thesis, IIT Chennai).
- Investigations on rubberised concrete in railway sleepers (B. Tech. Project, NIT Calicut).

PROFESSIONAL SERVICE

Workshop Organization

- Authored the draft of the post-session communique for CII and co-authored post-session summary report for a brainstorming session on creating Centre for Geoenvironmental Research and Innovation (CeGReIn), IIT Bombay, India, Mar 28, 2019.
- Co-authored post-session summary report and transportation committee member for brainstorming session on industrial by-products for sustainable development, IIT Bombay, India, Aug 22, 2018.

Invited Talks and Outreach Activities

- Depressurization for dissociation of class 1 type gas hydrates, TOUGH Symposium 2018, Lawrence Berkeley National Laboratory, Berkeley, California, US, Oct 2018.
- Depressurization study on class-1 type gas hydrates reservoir of Krishna Godavari Basin, ONGC and Pan-IIT Consortium. IIT Kharagpur, India, Dec 2018.

Journal Peer Reviewer

- Geotechnical Testing Journal; Geotechnique, Scientific Reports; International Journal of Geomechanics; Earth Science Reviews; Energy; Journal of Hydrology; Environmental Geotechnics; Fuel; Chemical Engineering Journal; Journal of Petroleum Science and Engineering.

PATENTS

1. Singh, D. N., and Lijith, K. P. “DetFroSS: A test setup for determining frozen soil shear strength”. Indian Patent No. 526044. Status: Granted on 14 March 2024.
2. Singh, D. N., Lijith, K. P., and Vikas Sharma “System and method for establishing soil freezing characteristic curve”. Indian Patent No. 543601. Status: Granted on 28 Jun 2024.

PUBLICATIONS

Journals

1. Lijith, K. P., Rao, R. S., Singh, D. N. (2024). “Detection of formation & dissociation of CO_2 gas hydrates in fine-sands through acoustic waves”. Fuel, 357, https://doi.org/10.1016/j.fuel.2023.129802.
2. Lijith, K. P., Sharma, V., and Singh, D. N. (2022). “Shear strength Characteristics of Frozen Fine-sands under Direct Shear Testing Conditions”. International Journal of Geomechanics, 22, 04021268. DOI: 10.1061/(ASCE)GM.1943-5622.0002228.
3. Lijith, K. P., Malagar, B. R. C., and Singh, D. N. (2019). “A comprehensive review on the geomechanical properties of gas hydrate bearing sediments.” Marine and Petroleum Geology, 104, 270–285. https://doi.org/10.1016/j.marpetgeo.2019.03.024.
4. Lijith, K. P., Rao, R. S., Singh, D. N. (2022) “Investigations on the influence of wellbore configuration and permeability anisotropy on the gas production from a turbidite hydrate reservoir of KG Basin”. Fuel, 317(7), https://doi.org/10.1016/j.fuel.2022.123562.
5. Lijith, K. P., Sharma, V., and Singh, D. N. (2021). “A methodology to establish freezing characteristics of partially saturated sands.” Cold Regions Science and Technology, 189, 103333. https://doi.org/10.1016/j.coldregions.2021.103333.
6. Lijith, K. P., Goli V. S. N. S., Yadav, R., and Singh, M. R. (2024). “Provenance studies on ancient mud mortar, plasters and floor soils of India’s Raigad hill fort.” Microchemical Journal, 199, 110223. https://doi.org/10.1016/j.microc.2024.110223.
7. Lijith, K. P., and Robinson, R. G. “Application of Asaoka’s method in multistage triaxial compression testing of normally consolidated soils.” Geotechnical Testing Journal, ASTM. 47(6). https://doi.org/10.1520/GTJ20230555.
8. Lijith, K. P., and Singh, D. N. (2024). “Unveiling the realm of thermo-hydro-mechanical characteristics of gas hydrate bearing sediments.” Journal of Marine Environmental Engineering, 11, 277-302. DOI: 10.32908/JMEE.v11.2022090101a.
9. Malagar, B. R. C., Lijith, K. P., and Singh, D. N. (2019). “Formation & dissociation of methane gas hydrates in sediments: A critical review”. Journal of Natural Gas Science and Engineering, 65, 168–184. https://doi.org/10.1016/j.jngse.2019.03.005.
10. Sharma, V., Lijith, K. P., and Singh, D. N. (2022). “Methodology to Determine Thermal Properties of Soils in Cold Regions from Heat-Pulse Migration Characteristics”. International Journal of Geomechanics, https://doi.org/10.1061/(ASCE)GM.1943-5622.0002538.
11. Chen, L., Feng, Y., Merey, S., Lijith, K. P., Singh, D. N., Komiya, A., and Maruyama, S. (2020). “Numerical investigation on gas production from Shenhu (China): Influence of layer inclination and horizontal inhomogeneities.” Journal of Natural Gas Science and Engineering, 82, 103509. https://doi.org/10.1016/j.jngse.2020.103509.
12. Feng, Y., Chen, L., Merey, S., Lijith, K. P., Singh, D. N., Komiya, A., and Maruyama, S. (2023). “Simulation of gas production from hydrate reservoirs (AT1) of Eastern Nankai Trough Japan.” Environmental Geotechnics, ICE Publishing, 10 (3), 176-185. https://doi.org/10.1680/jenge.19.00177.

Conference Proceedings

1. Lijith, K. P., Sharma, V., and Singh, D. N. (2021). “Investigations on the Influence of Ice-Content on Shear Strength Characteristics of Soils.” Challenges and Innovations in Geomechanics, M. Barla, A. Di Donna, and D. Sterpi, eds., Springer International Publishing, Cham, 911–916.
2. Motlagh, A. H., Lijith, K. P., and Priest, J. P. (2024). “Geomechanical Behaviour of Fine-grained Sediments Under K_0 Consolidation in a Triaxial Cell.” Proceedings of the GeoMontreal.
3. Kumar, J. S., Kalyan, N. S. S. P., Lijith, K. P., and Kandasami, R. K. (2024). “Investigations on Particle Migration During Suspension Injection Through Porous Medium Using X-Ray CT.” Geomechanics from Micro to Macro. IS-Grenoble 2024, Grenoble, France.
4. Shashikala, A. P., Anilkumar, P. M., Joseph, G., John, J., and Lijith, K. P. (2015). “Experimental Investigations on Use of Rubber Concrete in Railway Sleepers”, 2nd Raikar Memorial International Conference. International Symposium on Advances in Science & Technology of Concrete.
5. Anilkumar, P. M., Joseph, G., Lijith, K. P., John, J., Shashikala, A. P. (2015). “Investigations on Tensile Behaviour of Rubberised High Strength Concrete”, International Conference on Sustainable Energy and Built Environment.
6. Anilkumar, P. M., Shashikala, A. P., Joseph, G., Lijith, K. P., John, J. (2015). “Behaviour of Rubberised High Strength Concrete Under Impact Loads”, National Conference on Technological Innovations for Sustainable Infrastructure. National Institute of Technology, Calicut.

RESEARCH EXPERIENCE

Theme: Experimental & numerical studies on gas hydrate bearing sediments

- Synthesised gas hydrates in fine-sands and tracked the evolution soil stiffness during their formation and dissociation.
- Developed numerical models to simulate the effect of climate change on the dissociation of gas hydrates and its subsequent influence on the stability of the slopes of the Arctic Ocean.
- Modelled methane gas production from gas hydrate reservoirs of Krishna-Godavari Basin, South China Sea and Nankai Trough.

Theme: Thermo-hydro-mechanical characterisation of frozen soils

- Developed temperature-controlled direct shear apparatus for establishing shear strength characteristics of frozen soils.

- Established a methodology to determine the thermal properties of frozen soils using dual probe heat sensor and subsequent numerical scheme to analyse their heat migration characteristics.
- A methodology has been proposed to determine the unfrozen water content in frozen using their electrical properties.

TEACHING

Teaching Assistant (Hybrid, In-person)

- Teaching Assistant at IIT Bombay for the courses Geotechnical Engineering-I, Geotechnical Engineering-II and Environmental Geotechnics, Spring and Autumn semesters of 2020 & 2021.
- Teaching Assistant for the National Programme on Technology Enhanced and Learning (NPTEL) Online certification courses Geotechnical Engineering -I, Geotechnical Engineering -II, Environmental Geomechanics.
- Teaching Assistant at Indian Institute of Technology Madras for the undergraduate and post-graduate Geotechnical Laboratory courses.

ADVANCED GEOTECHNICAL LABORATORY TESTING EXPERTISE

- High-pressure temperature-controlled triaxial testing
- Temperature-controlled & standard direct shear testing
- X-ray computed tomography
- Thermal characterization of soils
- Isotropic & one-dimensional consolidation
- Ultrasonic wave velocity measurements in soils
- Single stage & multi-stage triaxial testing
- Oedometer testing
- Impedance measurements of soils
- Thermogravimetric analysis

REFERENCES

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