Dr Ankti Srivastava

Assistant Professor - Department of Civil Engineering

Indian Institute of Technology (Indian School of Mines) Dhanbad

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ankit-srivastava-ph-d-915a56285

PROFILE

Recently, I started working as an Assistant Professor in the Department of Civil Engineering at IIT (ISM) Dhanbad. Previously my role was a Project Engineer at WSP India Private Limited and there I dealt with the design of a mine tailings storage facility (TSF) distributed worldwide. My skills include conducting LEM and FEM slope stability assessment, stress deformation analysis, modeling the flow/seepage through TSF embankments/dams, implementing mitigation measures such as designing buttresses and drains within dam/embankments to enhance slope stability, interpreting laboratory and in-situ test data (i.e., CPT, Triaxial, Ring shear, DSS, VWP, etc.), preparing design and review reports, presenting project tasks to technical experts from abroad, etc.

EDUCATION

PhD – Geotechnical Engineering

IIT Guwahati

Assam, India, 781039.

BTech – Civil Engineering

NIT Srinagar

Jammu and Kashmir, India, 190006

SOFTWARE SKILLS

GeoStudio

Slide

AutoCAD

MATLAB

Origin

Hydrus-1D

RET-C

SolidWorks

INDUSTRY EXPERIENCE

Project Engineer – Tailings, iCRC Global Specialist Mining Team

WSP India Private Limited

October 2023 – September 2024

Noida, Uttar Pradesh, India

Project 1: MMG Rosebery Mine, ITRB Support Services, Tasmania, Australia

Reviewing the parameters related to foundations, embankments, and tailings and identification of both conservative and realistic design parameters based on field and laboratory results. Developed a verification stability model for various sections of TSFs using the limit equilibrium method. Finally, prepared a detailed summary report outlining all actions undertaken.

Project 2: Olympic Dam TRS, ITRB and EOR Services, South Australia

After meticulously reviewing various design reports, I compiled a historical summary report of TSFs. Following this, I conducted a verification stability assessment and seepage analysis of different TSF sections. Additionally, I developed and simulated a time-dependent stability and seepage model specifically for TSF 5 and 6, aiming to evaluate their future stability. Lastly, I prepared a concise stability assessment report summarizing the findings.

Project 3: BHP - GISTM Work Nicket West Deviance Accountability Report, Western Australia

I engaged to review and update the freeboard and stability assessment by analyzing historical data and recent findings from all the available design reports for the CDTSF.

Project 4: Prominent Hill Tailings Storage Facility – Stage 5 and Stage 6 seepage and stability assessments, South Australia

Project 5: Whinneyhall TSF- 2D Dynamic Deformation Analysis, UK

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RESEARCH AREA

Mine Tailings Behaviour

Constitutive Modeling of Soil

Numerical Modelling of Soil

Volume Change Response

Shear Strength Response

Yielding Characteristics

Hydraulic/flow Characteristics

Mitigation of Collapsible Soils

RESEARCH EXPERIENCE

PhD in Geotechnical Engineering, Indian Institute of Technology, Guwahati.

- Constitutive and numerical modeling of hydro-mechanical behaviour of unsaturated and saturated soils.
- Chemical stabilization of kaolin soil using a geopolymerization technique to reduce its wetting-induced collapse potential.
- Flow/hydraulic characteristics of unsaturated bentonites based on the experimental investigation, newly proposed constitutive model, and numerical simulations.
- Volumetric Shrinkage behaviour of expansive soils (i.e., bentonites of different plasticity).
- Study of large-strain shear strength behaviour of saturated kaolin soil using ring shear tests.
- Investigation of volume change and yielding behaviour of unsaturated kaolin soils using suction-controlled compression and wetting experiments.
- Teaching assistant of undergraduate and postgraduate theory and laboratory courses, such as “Geotechnical Engineering” and “Advanced Soil Mechanics” at IIT Guwahati.
- Teaching assistant of NPTEL course on “Unsaturated Soil Mechanics”- CE38 (Undergraduate and Postgraduate)
  Course Instructor – Prof. T.V. Bharat

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PUBLICATIONS

Published

- Srivastava, A., Bharat, T.V. (2024). Collapsible Soil Model for the Prediction of Mechanical Characteristics of Partially Saturated Collapsible Soils. International Journal of Geomechanics, ASCE. https://doi.org/10.1061/IJGNAI.GMENG-9037

- Srivastava, A., Bharat, T.V. (2024). Theoretical Framework for Large-Strain Shear Resistance of Kaolin Clays Under Chemo-Mechanical Loadings. Canadian Geotechnical Journal. https://doi.org/10.1139/cgj-2023-0327

- Bharat, T. V., Srivastava, A., & Gapak, Y. (2021). Prediction of wetting hydraulic characteristics of compacted bentonites in isochoric conditions. Journal of Geotechnical and Geoenvironmental Engineering, ASCE, 147(8), 04021067. https://doi.org/10.1061/(ASCE)GT.1943-5606.0002584

- Srivastava, A. & Bharat, T.V. Shearing Behaviour of Calcinated Kaolin Clay in Ring Shear Apparatus. Geo-Congress 2024, ASCE. https://doi.org/10.1061/9780784485309.039

- Srivastava, A & Bharat, T.V. Experimental Study on Volumetric Shrinkage Behaviour of Indian clays. Proceedings of Indian Geotechnical Conference 2021. Springer Nature. http://dx.doi.org/10.1007/978-981-19-6774-0_30

- Bharat, T.V., Das, P., Srivastava, A. (2019). Insights into Contaminant Transport Modeling Through Compacted Bentonites. In: Latha G., M. (eds) Frontiers in Geotechnical Engineering. Developments in Geotechnical Engineering. Springer, Singapore. http://dx.doi.org/10.1007/978-981-13-5871-5_6

Submitted/Accepted

- Srivastava, A., & Chapman, Peter. A Numerical Investigation of Phreatic Surface Drain-down Under Gravity and Corresponding Time-Driven Stability Enhancement of Tailings Storage Facility. (*Accepted in ICOLD 2024, 92th International Conference)*.

- Srivastava, A., Bharat, T.V. Stabilization of Kaolin Against Wetting-Induced Collapse by Geopolymerization through Sand Columns Matrix. (*Submitted* in Acta Geotechnica).

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KEY SKILLS

Statistics and Data Analysis

Proficiency in statistics and data analysis is crucial for designing experiments, analyzing data, and drawing meaningful conclusions. Thus, I explored the concepts like hypothesis testing, regression analysis, and data visualization for interpreting experimental results accurately.

Coding and Numerical Modeling

These skills are essential for implementing mathematical algorithms, numerical simulations, and data analysis. Thus, I learned programming languages like MATLAB and developed proficiency in other computational and presentation tools, including GeoStudio, Slide, RET-C, HYDRUS-1D, AUTOCAD-3D, etc. The transient seepage assessment and slope stability analysis of tailings storage facilities were performed in GeoStudio (seep/w and slope/w) and Rocscience (slide) packages. Flow through bentonite clays was numerically simulated in MATLAB, GeoStudio, RET-C, and HYDRUS-1D. Hydro-mechanical characteristics of kaolin soils, including wetting-induced collapse, compression, and yielding response, were predicted by estimating model parameters using statistical optimization technique in MATLAB.

Optimization Techniques

In my research work, the statistical optimization (least square method) and quantum particle swarm optimization algorithms-based MATLAB code was implemented to estimate the model parameters of proposed and existing hydro-mechanical models by minimizing objective functions.

Constitutive Modeling

The ability to create mathematical constitutive models representing real-world phenomena is a crucial skill. I developed various hydro-mechanical analytical models using the fundamental concepts of mathematics and physics based on the observed soil response (i.e., volume change, yielding, large-strain shear strength, and flow) to simulate, predict, and validate proposed hypotheses and experimental data.

Numerical Methods

Whenever analytical or closed-form solutions are not feasible, as in the case of solving parabolic partial differential equation of diffusion phenomenon, numerical techniques such as the finite difference and finite element methods allow us to approximate differential equations into solvable algebraic equations. These algebraic equations can be solved explicitly or implicitly depending on the complexity of the problem in each domain. I solved the governing diffusion equation of one-dimensional water propagation in compacted bentonites using an explicit scheme of finite difference technique.

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CERTIFICATIONS

- Global Initiative of Academic Networks (GIAN) participation course on "Mechanics of Unsaturated Soils" conducted by IIT Madras (10th – 20th December 2019)
- Teaching Assistant, NPTEL course on "Unsaturated Soil Mechanics" - CE38 (July 2018 – Oct 2018)

PROFESSIONAL MEMBERSHIPS

- Environmental Analyst, UK

EXTRA CURRICULAR ACTIVITES - TECHNICAL

Sl. No.	Symposium	Event/ sport	Level	Place
1	TECHVAGANZA'2k14	Technical Fest	National level	3rd
2	TECHVAGANZA'2k13	Technical Fest	National level	Participation

Declaration

I hereby declare that all the information stated above is true, correct, and complete to the best of my knowledge.

Ankti Srivastava

Date: 21-09-2024