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Morteza Shafiei

Ph.D. Candidate & University Instructor · Geotechnical Engineering

RESEARCH INTERESTS

Degradation and behavior of crushable glauconite sands · offshore wind foundations and site investigation · in-situ testing (CPTu) · pile setup and deep-foundation mechanics · calibration-chamber physical modeling · particle morphology.

EDUCATION

Ph.D., Civil & Environmental Engineering (Geotechnical Engineering) — 2021 – present

University of Massachusetts Amherst, Amherst, MA

Ph.D. candidate. Advisers: Prof. Don J. DeGroot, Sc.D., P.E., and Prof. Zachary J. Westgate, Ph.D., P.E. Research: degradation and behavior of glauconite sand for offshore wind foundations.

M.Sc., Civil & Geotechnical Engineering — 2015 – 2018

Amirkabir University of Technology (Tehran Polytechnic)

Adviser: Prof. Kazem Fakharian. Graduated with highest academic honors. Designed and operated a large-scale pressurized consolidation chamber for physical modeling of deep foundations.

B.Sc., Civil Engineering — 2010 – 2015

University of Tabriz

Solid mechanics, structural analysis, foundation engineering, and experimental soil mechanics.

PROFESSIONAL DEVELOPMENT

Cone Penetration Testing for Geotechnical Applications — Oct 2025

ConeTec & Menard · Waltham, MA

Presented by Dr. Peter Robertson, Kelly Cabal, Eric Rundstrom, and Jorge Fuentes. 7.0 Professional Development Hours (Professional Engineering & Geology), accredited by The Practicing Institute of Engineering.

PEER-REVIEWED JOURNAL PUBLICATIONS

1. Westgate, Z. J., Senanayake, A., **Shafiei, M.**, & DeGroot, D. J. (2026). Mitigation of CPT thrust force through glauconite sand. *Canadian Geotechnical Journal*, 63, 1–8. doi:10.1139/cgj-2026-0117
2. Kaviani-Hamedani, F., Esmailzade, M., Adineh, K., **Shafiei, M.**, & Shirkavand, D. (2024). Quantifying three-dimensional sphericity indices of irregular fine particles from 2D images through sequential sieving tests. *Granular Matter*, 26(1), Article 13. doi:10.1007/s10035-023-01376-1

3. Fakharian, K., **Shafiei, M.**, & Hafezan, S. (2023). Investigation of soil setup effects on pile response in clay considering overconsolidation ratio and installation method through physical modeling. *Canadian Geotechnical Journal*, 60(4), 488–503. doi:10.1139/cgj-2021-0686

CONFERENCE PAPERS & PRESENTATIONS

1. **Shafiei, M.**, Jaffé, D., Westgate, Z. J., & DeGroot, D. J. (submitted). Effect of particle degradation mechanisms on glauconite sand behavior. ASCE Geo-Congress 2027 (abstract accepted).
2. **Shafiei, M.**, Guo, D., DeGroot, D. J., & Westgate, Z. J. (2026). Effect of laboratory-induced degradation on the plasticity of authigenic glauconite sands [Poster]. Tufts 4th Annual Symposium in Geotechnical Engineering, Tufts University, Medford, MA, February 7, 2026.
3. **Shafiei, M.**, & Fakharian, K. (2018). Effect of installation method and pile type on soil setup using consolidation chamber physical modeling. M.Sc. thesis and conference proceedings, Amirkabir University of Technology.

HONORS & RECOGNITION

ARROW Student Spotlight
Nov 2025

ARROW — Academic Center for Reliability & Resilience of Offshore Wind

Featured for research on the mechanical behavior of offshore and onshore glauconite sand.

Student Highlight, ARROW 2025 Annual Report
2025

Recognized for evaluating the degradation of glauconite sand under static and cyclic loading.

M.Sc. with highest academic honors
2018

Amirkabir University of Technology (Tehran Polytechnic)

TEACHING, RESEARCH & MENTORING

University Instructor

Department of Civil & Environmental Engineering, University of Massachusetts Amherst

Lead laboratory and course instructor for undergraduate engineering mechanics and geotechnical engineering courses.

Graduate Research Assistant · ARROW student researcher

Offshore Geotechnics & Foundation Mechanics Group, University of Massachusetts Amherst

Laboratory and field research on glauconite sand for offshore wind foundations, including field CPTu testing within the Piling in Glauconitic Sand (PIGS) Joint Industry Project.

Undergraduate research mentoring

Geotechnical laboratory, University of Massachusetts Amherst

Works with undergraduate researchers on glauconite degradation testing (undergraduate co-author on the Geo-Congress 2027 paper).

SELECTED RESEARCH PROJECTS

Particle degradation of glauconite sand (Ph.D.)

- Hornerstown and Navesink glauconite sands (New Jersey) degraded by 1D compression to 50 MPa, ball milling, and dispersion-cup mixing, matched to the stress zones around a driven pile.
- Showed that particle-size classification alone is insufficient: free water and stress regime control the plasticity of the fines produced.

CPTu thrust reduction in glauconite sand (PIGS Joint Industry Project)

- Field comparison of cone size, friction-reducer length, diameter and number, and water jetting at a New Jersey site.
- A larger 15 cm² cone, a larger-diameter reducer, and upper-bevel water jetting significantly reduced thrust (layer-specific); longer or multiple standard reducers did not.

Pile setup in clay by calibration-chamber modeling (M.Sc.)

- 400 mm × 1000 mm consolidation chamber; CPT-size model pile with three strain gauges and three pore-pressure transducers; kaolinite at OCR 1.2 and 4.8; static load tests from 1 hour to 90 days.
- Driven piles set up faster and reached greater long-term shaft friction than jacked-in piles; setup separated into pore-pressure dissipation and aging components.

3D particle sphericity from 2D images

- Sequential sieving and X-ray micro-CT (3,000+ particles per material) linking 2D shape indices to 3D sphericity and Zingg flatness and elongation ratios.

TECHNICAL SKILLS

Testing	Field CPTu; calibration-chamber modeling; high-pressure oedometer; ball milling (LA abrasion); dispersion-cup degradation; hydrometer and sieve analysis; fall-cone Atterberg limits; X-ray micro-CT and SEM image analysis
Standards	ASTM D5778, D1143, D6913, D7928, D2435, D2487; ISO 17892-12; API RP 2GEO; ISO 19901-8
Instrumentation	Pore-pressure transducers, strain gauges, load cells, LVDTs; sensor calibration and signal conditioning
Software	PLAXIS 2D & 3D, FLAC, GeoStudio, Python (NumPy, SciPy, pandas), MATLAB, ImageJ, gINT, CPT-Pro