



2022 Annual Conference

Education, Research and Innovation: Tomorrow's Pillars

September 20th



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2022 Annual Conference

September 20, 2022

Aveiro Congress Center

Every year, MPP organizes its Annual Conference, a major meeting that brings together experts from Portugal and Massachusetts Institute of Technology (MIT) and other actors of the MIT Portugal Community to discuss recent advances in the scientific focus areas of MPP and impact on our society.



This year, the **MIT Portugal Annual Conference** has returned to an in-person format. It will be held on **September 20**, at **Aveiro Congress Center**, under the motto ***“Education, Research, and Innovation: tomorrow’s pillars”***, which seeks to discuss the importance of science and technology and its pillars, namely research, education, innovation for building the future.

For the first time, MPP will reward the work of Portuguese and MIT students via the MIT Portugal Program Poster Award. Students with MPP-FCT Scholarships or part of MPP projects, are invited to submit a poster showcasing their work in one of the strategic research areas of the MIT Portugal Program.

We look forward to seeing you in person at our Annual Conference!

Join us in Aveiro!!

Conference Chairs

Doug Hart

John Hansman

Pedro Arezes

Zita Martins

Organizing Committee

Ana Mena

Catarina Silva

Chrissy Mullin

Deliana Ernst

Joana Soares

Natalie Billings

Susana Costa

Support
FCT Fundação
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- [Project Research Posters](#)

Student Posters

The 2022 MPP call for student posters resulted into 65 posters from students from many Portuguese universities and MIT, showcasing the work of students in the 5 focus areas of the MIT Portugal Program. After a careful selection, 28 student posters have been shortlisted, and 5 have received an award for best poster at the conference on September 20th.

 Best Poster  Shortlisted

Filter by Research Area

Sustainable Cities

Search by Name

Apply

Analysis of the impact on building and mobility energy consumption from derelict building rehabilitation in Lisbon

Sustainable Cities

Pedro Lima

The Strategical Importance of Glass Structures, Experimental and Numerical Study

Sustainable Cities

Saeid Lotfi

Can vernacular knowledge adapt public space and optimize thermal comfort given the adverse effects of climate change?

Sustainable Cities

Albano Martins

Mod City. Transmedia projects for a sustainable and playful urbanism (work plan)

Sustainable Cities

Tiago Miguel Montês Mindrico

Mobility Mining–Graph Theory applied to assess COVID Pandemic effects on Users' Activity Space Relations using Social Media data

Sustainable Cities

Marcos A. P. Motta

Geosynthetics for sustainable cities: 3D models and mechanical damage

Sustainable Cities

Lucas Paiva

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Geosynthetics for sustainable civil models and mechanical damage

Sustainable Cities
Lucas Paiva

Influence of the conductive material type on the performance of inverted perovskite solar cells

Sustainable Cities
Joana Príncipe

Uncertainty interpretations for the robustness of object detection in self-driving vehicles

Sustainable Cities
Filipa Ramos Ferreira

To what extent can hydrogen electrolyzers (HEs) contribute to operation of future power systems with low inertia per

Sustainable Cities
Fernando Ribeiro

How can the different charging behavior of EV users have impact on EV charging Scheduling?

Sustainable Cities
Mahla Shariatzadeh

Bringing the future to municipal solid waste management systems

Sustainable Cities
Adriano Silva

Wooden buildings as a strategy for carbon neutrality in Portugal

Sustainable Cities
Marina Tenório

Geosynthetics for sustainable cities: 3D models and mechanical damage



Lucas Carvalho Paiva¹

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². TEMA, Department of Mechanical Engineering, University of Aveiro, Portugal.

³. RISCO & Department of Applied Mechanics, Polytechnic Institute of Bragança, Portugal

MIT Portugal

2022 Annual Conference

Why Geosynthetics?



Figure – Geogrid for pavement reinforcement

Geotechnical Structures

Infrastructure demand is a major global challenge. Geotechnical Engineering is relevant not only for foundations of buildings, but also roads, bridges and even mining, coastal and offshore applications.

Geosynthetics

Geosynthetics are often the most efficient, cost-effective and environmentally-friendly solution to a variety of earthworks, contributing to SDG goals 9 & 11.

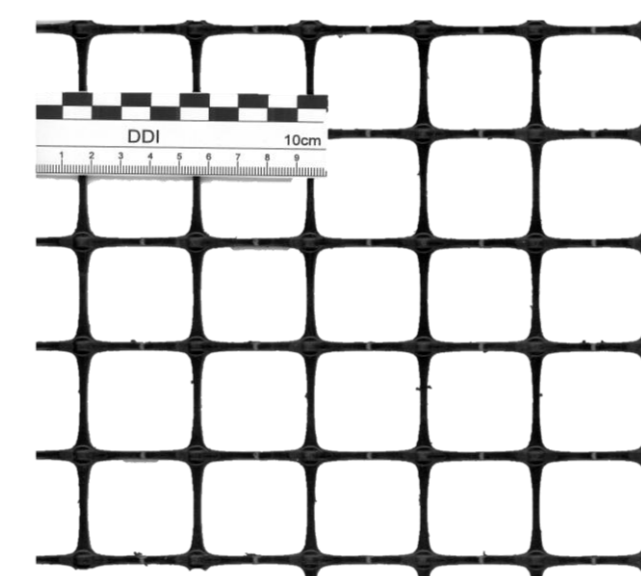


Figure – Geogrid

Geogrids

Used in reinforcement and stability. The apertures promote the interlocking of granular particles and significantly improve soil stability. Used in roads, railways, embankments, dams and more.



Figure – Geotextile

Geotextiles

Major applications are separation, reinforcement and filtration. Improving the performance of soft soils and/or acting as basal reinforcement. Used in landfills, railways, piles, mine integrity and more.

Experimental & Numerical Program

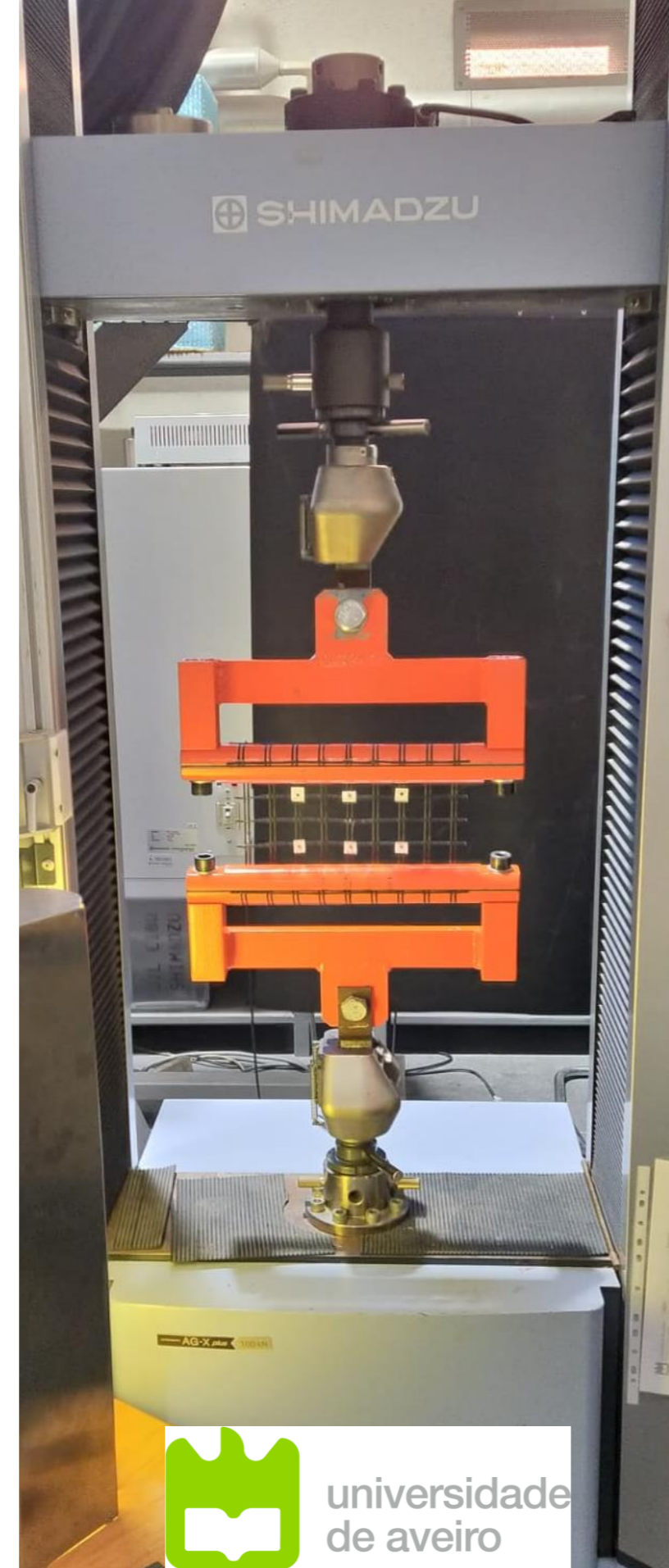
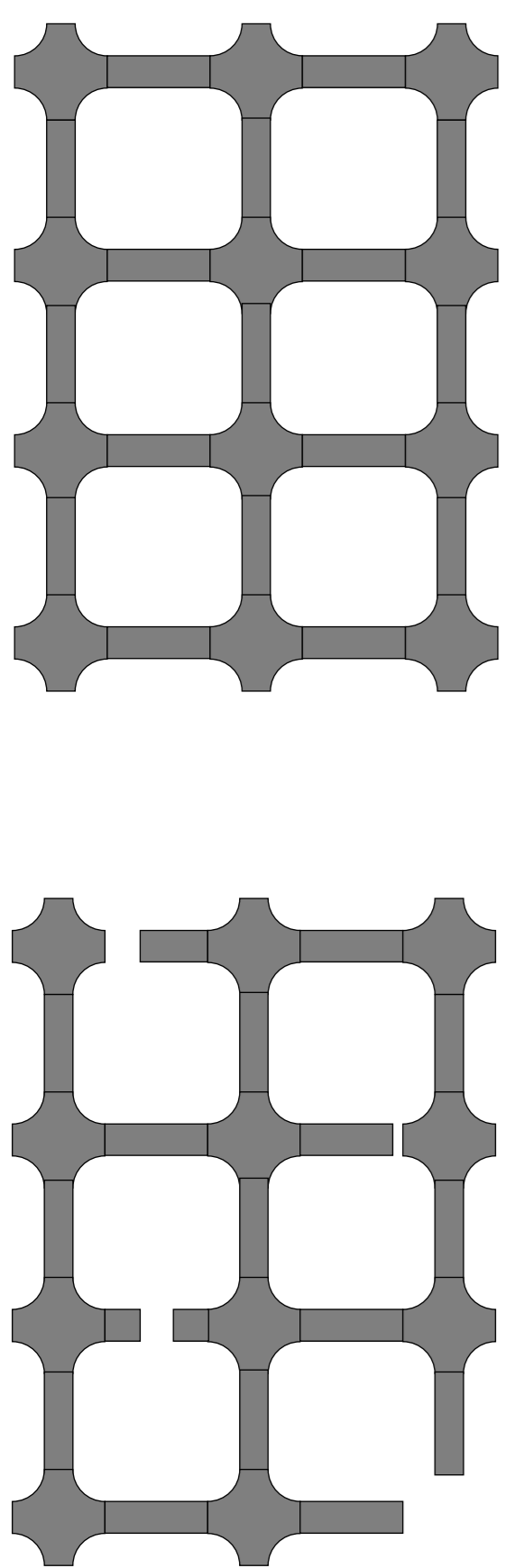


Figure – Mechanical damage (left), triaxial test (middle), tensile test (right)

In-isolation Tensile Tests

To understand the mechanical properties:

- Short-term
- Long-term

Soil-Geosynthetic composite response

To characterize the interaction:

- Perform triaxial tests
- Analyze pullout tests results

Mechanical damage

Parametric analysis on how the damage affects the performance of reinforcement

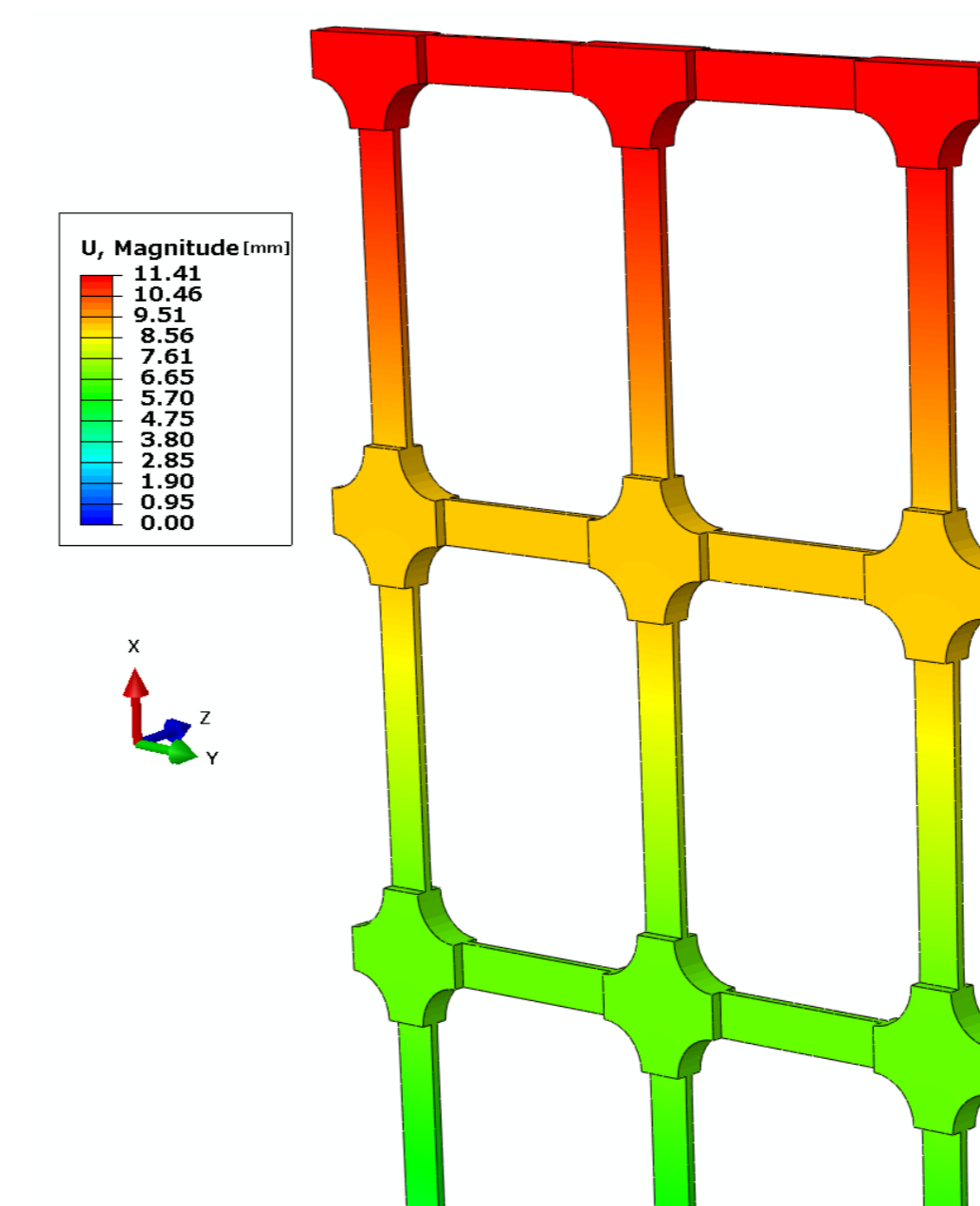
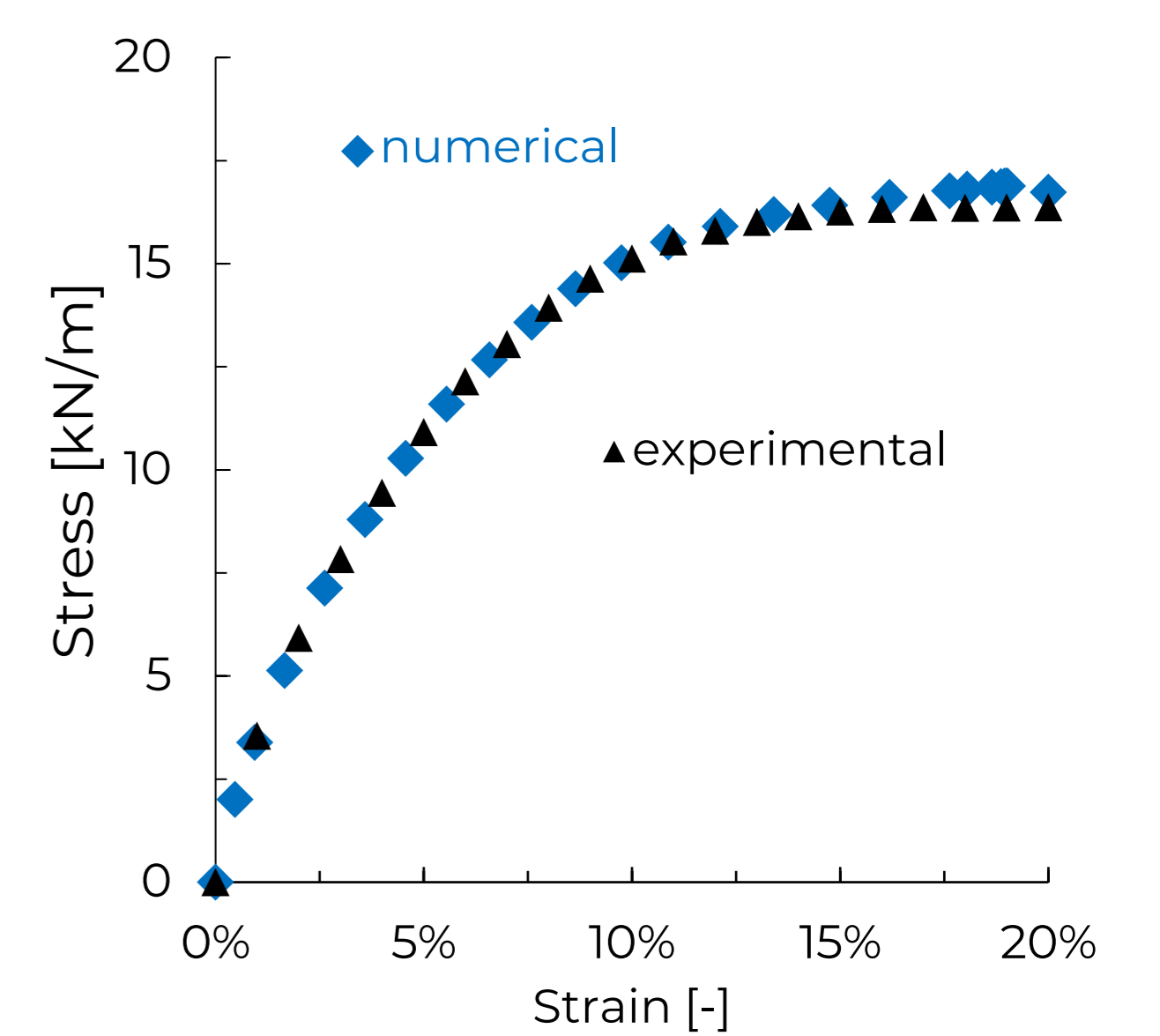


Figure – FEM tensile test first results



3D Models

Simplifications in geometric & mechanical properties often compromises the model. Improve analysis by employing 3D nonlinear models capable of capturing the exact geometry and response over space and time.

Next Steps

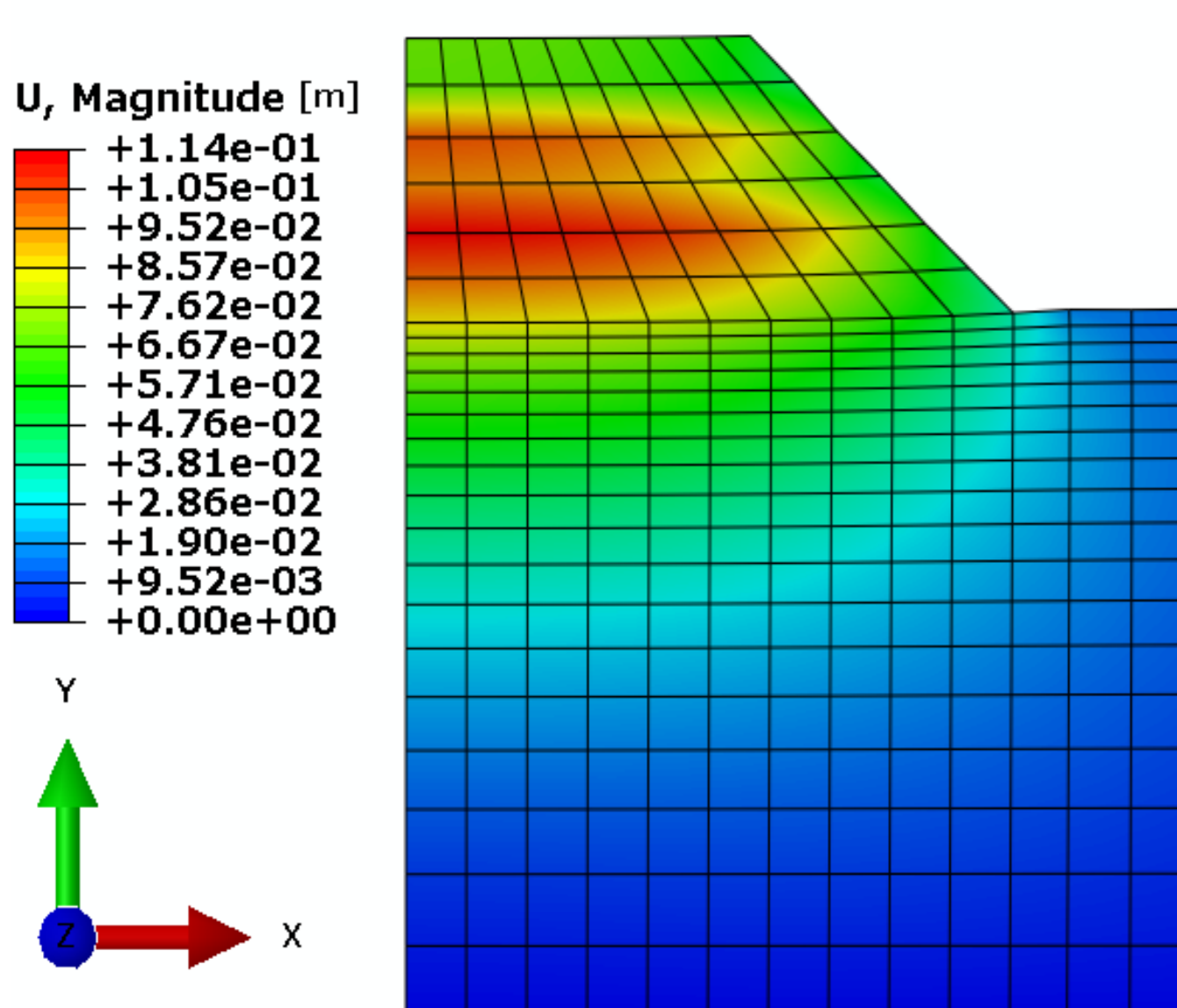


Figure – Settlement in reinforced embankment

Real Structures

Verify if calibrated models replicate the response of real structures. Promote the numerical analysis with nonlinear & time-dependent constitutive models.

Mechanical damage

Expand the current understanding of the synergetic effects of mechanical damage associated with installation and creep.

Highlights

- 3D numerical modelling with exact geometry.
- Advanced constitutive models considering nonlinear stiffness, strain softening, creep and direction dependency.
- Backed by experimental results.
- Assess ultimate and serviceability response of undamaged and damaged reinforced structures.
- Contribute to a better use of both geosynthetics and soil resources.

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MIT Portugal

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