

Special Issue

Advances in Slope Stability and Rock Fracture Mechanisms

Message from the Guest Editor

Rock slope stability is inherently governed by discontinuous fracture networks and damage evolution within rock masses. Traditional continuum-based theories face significant limitations in addressing the multi-scale defects (e.g., joints, pores, microcracks) that dominate rock failure. Recent advances integrate micromechanical fracture modeling, cross-scale monitoring, and nonlinear system analysis to reveal the chained processes from microcrack coalescence to macroscopic rupture. This Special Issue highlights cutting-edge methodologies for rock fracture mechanics in slope engineering, including, but not limited to, the following:

- Multi-physics coupling mechanisms under hydromechanical forcing (e.g., rainfall/freeze-thaw);
- Three-dimensional damage propagation modeling using GPU-accelerated DEM-PFEM frameworks;
- Fracture evolution laws from laboratory tests to field-scale UAV mapping;
- Real-time fracture monitoring via distributed fiber optics/microseism;
- Machine learning-based early-warning of slope instability.

Original work highlighting the latest research and technical development is encouraged, but review papers and comparative studies are also welcome.

Guest Editor

Dr. Penghai Zhang

Center for Rock Instability and Seismicity Research, School of Resources and Civil Engineering, Northeastern University, Shenyang 110819, China

Deadline for manuscript submissions

20 August 2026



Applied Sciences

an Open Access Journal
by MDPI

Impact Factor 2.5
CiteScore 5.5



mdpi.com/si/244959

Applied Sciences
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
applsci@mdpi.com

[mdpi.com/journal/
applsci](https://mdpi.com/journal/applsci)





Applied Sciences

an Open Access Journal
by MDPI

Impact Factor 2.5
CiteScore 5.5



[mdpi.com/journal/
applsci](https://mdpi.com/journal/applsci)



About the Journal

Message from the Editor-in-Chief

As the world of science becomes ever more specialized, researchers may lose themselves in the deep forest of the ever increasing number of subfields being created. This open access journal *Applied Sciences* has been started to link these subfields, so researchers can cut through the forest and see the surrounding, or quite distant fields and subfields to help develop his/her own research even further with the aid of this multi-dimensional network.

Editor-in-Chief

Prof. Dr. Giulio Nicola Cerullo
Dipartimento di Fisica, Politecnico di Milano, Piazza L. da Vinci 32,
20133 Milano, Italy

Author Benefits

Open Access:

free for readers, with article processing charges (APC) paid by authors or their institutions.

High Visibility:

indexed within Scopus, SCIE (Web of Science), Ei Compendex, Inspec, Embase, CAPIus / SciFinder, and other databases.

Journal Rank:

JCR - Q2 (Engineering, Multidisciplinary) / CiteScore - Q1 (General Engineering)