

WHY DON'T WE PREDICT WHEN LANDSLIDES WILL OCCUR?



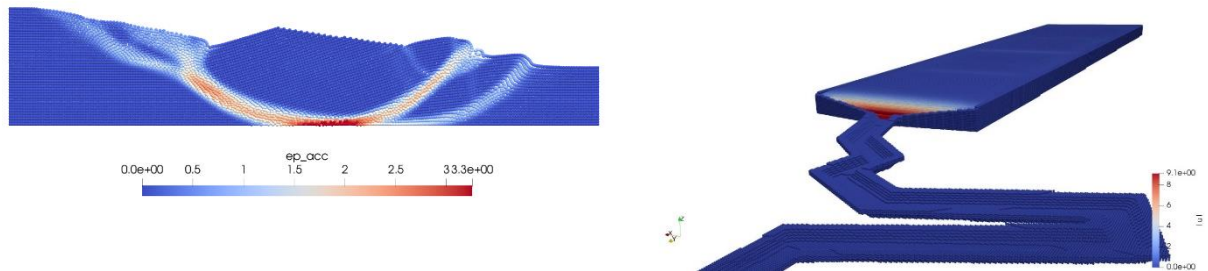
Source: AFP/Getty Images

Looking for students who want to get involved with an exciting opportunity to do cutting-edge research and learn about geohazards, high-performance computing, and computational simulations.

Research Overview:

Geohazards such as landslides, debris flows, mudflows, flooding are ubiquitous phenomena around the world and pose a threat to lives and property. According to the United States Geological Service (USGS), in the U.S. alone, between 25 and 50 people lose their lives, and over two billion dollars of property damage and insurance claims occur every year as a result of landslides. Predicting when geohazards will occur and quantifying their impacts on populated areas and infrastructure can have a major impact in land-use management and policy. Furthermore, by having ways to predict when such events will happen, we can create early warning systems that will alert at-risk populations, with the potential to save lives. Prof.

Fávero's research group works in the interface between structural and geotechnical engineering, the geosciences, computer science, and policy. The main focus of his group is to develop, test, and deploy computer software that is capable of simulating geohazards. The objectives of such software are two-fold: (1) predict when geohazards will occur, and (2) determine the impacts of the geohazards in vital infrastructure (such as bridges, power lines, pipelines, etc.) and on populated areas. The software developed has the potential to be used by engineers, land-use planners, and policy-makers alike to better inform their decisions about infrastructure placement and human settlement in geohazard-prone areas. As a bonus, some of the technologies developed in the software are applicable to other areas of engineering, science, and computer science. For example, the underlying solver of the physical equations in the software can be applied to simulate fluids, soils, and soft tissues (biomedical applications). It is also applicable to computer graphics and animations used by major Hollywood studios like Disney's Pixar.



Figures: Computer models of slope failing under seismic loads and of a sediment dam and associated drainage channel. The latter model was used to determine the flooding zone in the event of a breach. Both models were developed using Prof. Fávero's research software.

Position Description:

Two fully-funded (i.e., all costs are covered) research master's positions (full-time), one starting Fall 2024 (August 2024) and another to start in Fall 2025, to work in Prof. Fávero's research group. The master's degree at Bucknell University has duration of two years, and a requirement of the graduate program is the completion of a thesis. The thesis is considered an original contribution to the body of engineering knowledge.

Bucknell's graduate studies program offers students the opportunity to work and learn side by side with professors who are committed to building your knowledge and experience. Bucknell provides the resources of a large research institution coupled with smaller class sizes and personal attention.

Minimum Required Background:

- Bachelor's degree in Civil Engineering with a minimum GPA of 7.0 by January 2024 (or January 2025)
- Basic-to-intermediate conversational English

- Interest in computer science and computer modeling/design
- Enjoys working closely with faculty and has good interpersonal and communication skills
- Innate curiosity and self-motivation

How to Apply:

Send an unofficial transcript to alomir.favero@bucknell.edu. Please write “MSc Position Application - Brazil” as the subject of the email. Additionally, in the body of the email, briefly (in 100-200 words) describe why you are interested in the research position and studying abroad. Send your email preferably by November 15th, 2023. On a rolling basis, select candidates will be scheduled for a 15- to 20-minute videoconference interview. A final decision will be made in early December 2023.

Admitted students, upon receiving the letter of approval from Prof. Fávero, must complete the university required application to the graduate program. Applications close on February 1st, 2024. More information about the application can be found at <https://www.bucknell.edu/academics/graduate-studies/how-apply>.

Research activities will start on July 1st, 2024. Please contact Prof. Fávero at any time with inquiries or if you have questions.

About Prof. Fávero:



Professor Alomir Fávero's research interests are in the development of continuum meshless numerical methods and their applications for modeling geomaterials such as soils, rocks, concrete, and other granular matter. In particular, his focus is on modeling and predicting when geohazards (such as landslides, debris flows, etc.) will occur, and evaluating their impacts on populated areas and on infrastructure. Professor Fávero is natural of Botucatu (SP), earned his B.S. in Civil Engineering and M.Sc. in Structural Engineering from the São Carlos School of Engineering (USP) in Brazil, and his Ph.D. in Computational Geomechanics from Stanford University in the U.S. Prior to his doctoral studies, Prof. Fávero worked as a structural steel designer and as a researcher for the Institute for Technological Research (IPT) in Brazil where he led major forensic engineering projects, including determining the causes of a major crane collapse during the construction of the 2014 World Cup opening ceremony stadium. Prof. Fávero is an Assistant Professor of Civil and Environmental Engineering at Bucknell University (U.S.), and when he is neither teaching nor doing research, he likes to hike with his partner Vicki and their husky Kimchi in the great outdoors of Central Pennsylvania.

About Bucknell University:



Bucknell University is a private liberal arts college in Lewisburg, Pennsylvania. Founded in 1846, it consists of the College of Arts and Sciences, Freeman College of Management, and the College of Engineering. It offers 65 majors and 70

minors in the sciences and humanities. Located just south of Lewisburg, the 445-acre (1.80 km²) campus rises above the West Branch of the Susquehanna River. Approximately 3,800 students attend the university. The school is a member of the Patriot League in NCAA Division I athletics and its mascot is the Bucknell Bison. With around 400 faculty, the faculty to student ratio is 9:1 with the average class size of approximately 20 students. Bucknell has traditionally had strong engineering programs. Among U.S. colleges that do not offer a PhD in engineering, Bucknell was ranked 7th, according to the 2024 edition of the U.S. News & World Report college ranking, and the same report ranked Civil Engineering 3rd. More information about Bucknell University can be found at <https://www.bucknell.edu>.