

Keynote

Recent advances on uncertainties and solutions for a reliable and effective prediction of rockfall hazard and risk

Biography



Anna Giacomini is Professor in Civil Engineering at the University of Newcastle and the Director of the Priority Research Centre for Geotechnical Science and Engineering in the College of Engineering, Science and Environment of the University of Newcastle. Anna received her PhD in Civil Engineering in 2003 from the University of Parma (Italy) and she has been working in the field of rock mechanics and rockfall analyses for more than 20 years. Adapting to the new Australian Environment, she has extended her extensive research experience in rockfall analysis and rock mechanics from civil engineering to mining. Since 2009, she has been leading several major research projects through industry and government funds on rockfall hazard and mitigation developing new designs for engineered barriers to protect valuable major corridors, infrastructures, and recreational areas from rockfall hazards. Anna's contribution to science in rock mechanics and rockfall analysis has been recognised by several awards such as the 2019 John Booker Medal from the Australian Academy of Science and the 2019 Best Practice Industry Engagement Award she received from the Newcastle Institute for Energy and Resources. Anna has published over 150 scientific works, she serves as Editorial board member of four prestigious International Journals in the field, as reviewer for several national and international funding bodies and many international journals in the rock mechanics and engineering fields.

Abstract

An effective management of rockfall risk is paramount in both civil and mining engineering. Rockfall represents one of the major natural hazards, threatening human life along pivotal national transportation networks, recreation coastal areas and popular scenic walking paths, and personnel and machineries in mining environments. Empirical methods and probabilistic rockfall simulations are generally applied to predict the associated risks accounting for some of the several uncertainties associated with rockfall scenarios. The lecture will present recent developments on the investigation of the effect of rock slope features and impact conditions variability on a reliable estimation of rockfall energies and run out distances at the base of sub-vertical rock faces. Extensive and unique laboratory and field data of rockfall events collected over recent years and probabilistic simulations are used to derive empirical correlations for a rapid estimation of the expected motion parameters, such as fragmentation at impact, impact energies and run out conditions, to be considered for an effective mitigation of rockfall risks. Recent results obtained on the application of data driven models for 2D rockfall trajectory prediction and hazard assessment will also be presented and provide new insights into the risks associated with the uncertainties of current rockfall simulations.