

## **Keynote: Numerical modelling for the design of rockfall mitigation systems for civil and mining applications**

**Keynote Speaker: Prof. Anna Giacomini, The University of Newcastle**

**Abstract:** An appropriate management of rockfall risk is paramount in both civil and mining applications. Rockfall represents one of the major natural hazards, threatening human life along pivotal national transportation networks, recreation coastal areas and popular scenic walking paths. In the context of mining environments, safety of workers and machineries in all mine areas affected by rockfall has to be rigorously managed. Appropriate mitigation measures become necessary to reduce the risk to an acceptable level and minimise any potential economic loss in the production caused by an event. Several empirical and numerical approaches have been proposed to design various active and passive rockfall protective structures over the last four decades. The lecture will present recent developments of the discrete element method (DEM) and the finite element method (FEM) to simulate the impact of falling rocks against rockfall protection systems, such as draperies, rockfall barriers and dumping modules, to investigate their energy absorption capacity and efficiency. The models have been calibrated and validated by comparing numerical predictions with laboratory and field scale experimental findings. Results show the models' capability to adequately simulate realistic rockfall scenarios and accurately assess the residual rockfall hazard associated to the modelled structures, providing a valid tool for future mitigation designs.

**Prof. Anna Giacomini** received her PhD in 2003 from the University of Parma, Italy, and joined the University of Newcastle in 2005. She is currently Professor in Civil Engineering at the University of Newcastle and, since May 2019, along with her full time research and teaching academic role, she is also 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 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 recent 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. She is currently the member of ARC College of Expert.

