# Conferencista Magistral



## Omid Mahabadi

## Topic: An overview of numerical methods used for modeling rock fracturing process

Omid Mahabadi is the president, CEO and a co-founder of Geomechanica. He holds a PhD degree in rock mechanics (civil engineering) from the University of Toronto. Omid specializes in development and application of advanced numerical simulation tools to solve rock engineering problems in civil, mining, and petroleum engineering. Omid was the lead developer of Y-Geo FDEM code and the sole developer of Y-GUI and GeoLab DAQ codes. He has authored or co-authored over 40 articles in peer-reviewed journals and conferences and acts as reviewer for many technical international journals and funding agencies in Canada

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**Resumen**

Numerical modelling of rock deformation and failure poses major challenges, including: presence of heterogeneities and discontinuities (joints, faults), non-linear stress-strain response, and confinement-dependent behaviour. A brief overview of the numerical methods commonly used in practice are provided, together with their strengths and shortcomings. It is shown that these methods either ignore stress and deformation (e.g. limit equilibrium method), assume the rock to be continuous (e.g. traditional finite element methods), or represent the rock mass as complete blocks (e.g. discrete element method). The finite-discrete element method (FDEM) overcomes these limitations and makes it possible to study the failure of rock masses with incorporation of complex kinematic mechanisms. At the core of FDEM is the fracture model that uses the cohesive element approach to capture tensile, shear, and mixed-mode fracturing in intact rock and along pre-existing joints/faults. Contact detection and interaction formulations resolve interactions of discrete bodies (either pre-existing or created via fracturing). To show the application of FDEM, a number of practical case studies in surface and underground mining as well as civil engineering are presented. These applications demonstrate that large displacements and fracturing in discontinuous rock masses can be simulated without using complex constitutive models.