Principal Geotechnical Engineer

Expertise	Material Processing, Soil and Rock Mechanics, Discrete and Continuum Numerical Modeling
Education	Ph D. (Civil Engineering), 1999 Postgraduate (Civil Engineering), 1995 Ecole Centrale Lyon, Ecully, France M.Sc. (Civil Engineering), 1994 University of Sciences and Technology, Lille, France

Professional Experience

Itasca Consultants S.A.S., Lyon, France

2018 – Present	Principal Geotechnical Engineer
2005 – Present	IT infrastructure management
2005 – 2018	Senior Geotechnical Engineer
2005 – 2012	Responsible for software sales, support, and marketing
1999 – 2005	Geotechnical Engineer

Ecole Centrale Lyon, Civil Engineering Department, Ecully, France

1994 – 1999	Scientific Collaborator

Project Experience

Consultant in Process and Civil Engineering, Numerical Modelling: Project manager or supervisor of Process Engineering projects dealing with the analysis and optimization of medium compacity, both at the powder and block scale (silos, lime kilns), transport, flow, and segregation phenomena.

Consultant on various civil engineering projects - masonry bridges, dams, slope stability, tunnels, underground storage of radioactive waste in France, Germany, Belgium, and Switzerland, damage and creep around an excavation and hydromechanical behavior of fractures in shear for geothermal platforms or CO_2 storage sites.

Research and development: Participation in many National and European research programs, and co-supervision of several thesis in collaboration with Ecole Centrale de Lyon, ENTPE, University of Clermont-Ferrand, and Ecole des Mines de Saint Etienne, on subjects such as the stability of rockfill dams under statistical and dynamic loads, the dam damage under cyclic thermal and mechanical loads, the stability of dry stone bridges, Lahars flows, and the development of new numerical methods to improve the simulation of powders in the industry.

Numerical development: Development of multiple coupling procedures between discrete and continuum modelling software, as well as between mechanical and thermal or fluid flow codes.

Teaching: Organization and participation of training sessions in numerical modelling for engineers, on aspects relating to the modelling of discrete media, coupled thermo-hydro-mechanical phenomena and rock damage phenomena.

Projects

Process Engineering
- Modeling of an experimental compaction process (shock test) and analysis of binary and ternary granular mixtures on the minimal porosity of the assembly (PFC^{3D})
- Modeling of a sieve process by considering the flexibility of the wire (PFC^{3D})
- Analysis of the bending strength of a porous discrete medium composed of fibers and optimization of the gravity setting process (PFC^{3D})
- Development of a skeletal image transfer module allowing the calibration of inter- and intra-fiber micromechanical parameters (PFC^{3D})
- Compaction of bauxite powders (recycling) to be used in lime kilns. Optimization of the shape of recycled bauxite blocks to increase kiln efficiency (PFC^{3D})
- Analysis of lime and limestone block segregation as they fall into a silo and then empty. Optimization of the silo loading and unloading system (PFC^{3D})
- Modelling of a vertical lime kiln and study of the thermomechanical behavior: optimization of the particle size distribution and the shape of the blocks to improve the heat flow in the vertical kiln and avoid dead zones and preferential flow paths (PFC^{3D}/CFD software)
- Modelling of the thermomechanical behavior of a rotary kiln to improve the quality of the mixture: addition of various-shaped lifters and adaptation of the test parameters (rotation speed and filling rate) (PFC^{3D})
- Modelling of an anode material to study the influence of its microstructure and composition on its thermo-hydro-mechanical properties and behavior (PFC^{2D}).

Civil Engineering
- Study of static and dynamic stability of rock dams under cyclic hydraulic pressure loading and seismic loading (PFC^{3D}/FLAC^{3D} or PFC^{2D})
- Modeling of a furrow cutting using a plow to lay underwater cables. Study of beneficial effects and limits of Rock Ripper (PFC^{3D})
- Demonstration of the accuracy to apply AC/DC (Adaptive Continuum/Discontinuum Code) model to a realistic 3D excavation and obtain reasonable damage predictions (PFC^{3D})
- Evaluation of the permeability of the failed/damaged zone around a 2m radius tunnel by first computing probable micro-fracture networks in the post-peak and damaged zones and then assessing the equivalent permeability of such networks (PFC^{3D})
- Elaboration of hydro-mechanical models by interpreting the disturbances observed during the sinking of the main shaft of an underground laboratory in Eastern France (*FLAC^{3D}*, *3DEC* and *PFC^{3D}*)
- 2D and 3D analysis for design of underground nuclear waste disposal including constitutive law calibration, short-term and long-term analysis, considering thermo-hydro-mechanical coupling phenomena (*FLAC^{3D}* and *3DEC*).

Mechanical Engineering
- Study of the hydraulic conductivity evolution in a fractured rock submitted to high hydraulic pressure, in a geothermal injection well (PFC^{3D})
- Study of the well and near-field behavior during CO2 injection (PFC^{3D}/*FLAC* or PFC^{3D})
- Evaluation of mechanical behavior in a completely non-cemented sandstone, with perforations located away from the caprock interface (PFC^{3D})
- Modeling of blade displacements and contact forces evolution in a granular material until stationary movement occurs in front of the blade (PFC^{3D})
- Influence of the geometry of a cutting tool and its introduction into healthy rock (saturated or not) to limit the effective power (PFC^{3D})

- Study of the mechanical behavior at the interface of a submarine tidal turbine foundation with granitic rock: rock fracturing and foundation penetration (PFC^{3D})
- Modeling of fractures evolution in rock masses made of several sedimentary rocks and subjected to tectonic compression movements (PFC^{2D})
- Modelling of a Lahars flow (mudflows with volcanic rock debris), and analysis of blocks and mudflow impact with the surrounding infrastructure (PFC^{3D}/CFD software)

Mining
- Development of a micromechanical model to predict the risk of material collapse during undercutting operations (PFC^{2D}).
- Modeling of the Leo slope failure occurred at Bingham Canyon Mine on May 2021 to assist in better predicting the distribution of ore and grades in the runout mass to inform mining design (PFC^{3D}).

Analytical Developments in Soil Mechanics
- Development of constitutive models, based on micro-mechanical approaches, considering scale changes in granular materials with complex interactions: local kinematics (rolling, sliding and displacement of particles that are not in contact), the influence of contact couples, and study of cemented granular material failure (Ecole Centrale Lyon)