ITASCA

Geomechanics Engineer

Expertise	Thermo-Hydro-Mechanical-Chemical (THMC) Coupling, Computational Geosciences, Rock Mechanics
Education	Ph.D. (Geosciences and Geoengineering), 2019 Mines Paris-PSL, Paris, France
	M.Sc. (Rock and Soil Mechanics), 2015 Ecole des ponts ParisTech, Champs-sur-Marne, France
	B.Eng. (Civil Engineering), 2014 Hassania School of Public Works, Casablanca, Morocco
Professional Affiliations	Member: American Rock Mechanics Association (ARMA), American Geophysical Union (AGU), International Society for Rock Mechanics (ISRM)
Honors	Spot award, Volunteer LEAD for the success of CouFrac 2022, Berkeley Lab (2022)
	Pierre Londe Ph.D. prize, French Society of Rock Mechanics (2020)

Professional Experience

2024 – Present	ITASCA Minneapolis Geomechanics Engineer
2020 – 2024	Lawrence Berkeley National Lab, Energy Geosciences Division, Berkeley, CA Postdoctoral Scholar

Project Experience

Numerical Modeling of Coupled THMC processes in the subsurface: Developed numerical models using finite element code (COMSOL) to simulate the geomechanical consequences of artificial ground freezing on exploitation tunnels located in non-frozen rock in the mine of Cigar Lake, Canada. Developed numerical models using sequential code TOUGH-FLAC to simulate the short- and long-term behavior of a generic salt repository for high-level radioactive waste, over 10,000 years, using state-of-the-art constitutive models of rock salt and crushed salt. Conducted coupled HM simulations of fault reactivation due to CO_2 sequestration using TOUGH-FLAC simulator.

Laboratory and Field Experimentation: Contributed in setting up an experimental facility for triaxial compression tests under controlled temperature, including sub-zero temperatures, and strain rate conditions. Designed and performed extensive laboratory experiments to characterize the mechanical behavior of frozen Metapelite specimens from the mine of Cigar Lake. Designed and performed stress-free freezing-thawing laboratory tests, carried out on limestone specimens initially fully saturated with sodium chloride solutions at various concentrations.

Numerical code development: Extended the TOUGH3-FLAC7 simulator capabilities to include water/ice phase change in a porous medium. Performed a geomechanical investigation of a novel idea on building geo-cooling using subsurface ice-based thermal energy storage.

Numerical code validation: Demonstrated the applicability and capabilities of coupled THM models through analytical solutions, and lab and field experiments, for instance, the Brine Availability Test in Salt (BATS) at the Waste Isolation Power Plant in New Mexico.