Derrick J. Blanksma – ITASCA Minneapolis

Geotechnical Engineer/Software Developer

Expertise

Soil and Rock Mechanics, Numerical Modeling of Discrete and Continuous Media, Coupled and Uncoupled Mechanical-Fluid Flow Modeling, Reinforced Earth Modeling, Developing Numerical Modeling Software Applications (C++, including *Qt* bindings; Python)

Education

M.S. (GeoEngineering), 2013
University of Minnesota

B.S. (Geological Engineering), 2011
University of North Dakota

B.A. (Physics and Mathematics), 2009
Concordia College

Professional Affiliations

Member: American Geophysical Union; Minnesota Geotechnical Society

Professional Experience

	ITASCA Minneapolis
2013 - Present	Geotechnical Engineer

Project Experience

FLACLab — Primary developer of a *GUI* application that gives a *FLAC3D* user a robust tool to perform simulated material laboratory tests. The *GUI* application allows the user to select a variety of simulated material tests including uniaxial, biaxial, triaxial, simple shear, and pure shear laboratory tests. The intent of the project is to provide a user with a seamless and intuitive graphical interface that passes commands to the *FLAC3D* engine to carry out the finite-difference numerical analysis and determine material behavior. In addition, the user would be able to input field data to compare with their simulated results and select their own or built-in constitutive models. The comparison with field data would allow the user to gauge the accuracy of the constitutive model representing the real material. Currently, the project is in development, and future options envision an automated feedback system that will back-analyze the best-fit parameters from field data.

Material Modeling Support Testing Environment — Primary developer of an automated system to test new release versions of the ITASCA material modeling support package (*FISHTank*). The system would automatically trigger a suite of tests when a change was implemented to the source code of the *FISHTank* or the source code in *PFC Suite*. The testing system compared expected simulation results and would report any errors via email once the testing was completed. Automated testing of software packages ensures product reliability and helps developers identify potential bugs in the source code. The testing system utilized batch scripting and *TortoiseSVN* hook scripts to continually monitor any changes to the source code and trigger if a change was detected.

Software Support — Technical support engineer responsible for all *Particle Flow Code* (*PFC*) inquiries. Technical problems sent by customers included command syntax and usage, basic physical concepts, writing custom examples and source code modification. Customer satisfaction and providing clear, concise, and accurate information was the top priority.

Consulting

Development and Testing of a 2D Rock-Cutting Application — Technical engineer responsible for the development and testing of a rock-cutting application built for National Oilwell Varco (NOV). The simulated rock-cutting environment was built in Particle Flow Code (*PFC*) with a majority of the functionality coded with *PFC's* built-in language, *FISH*. The model aimed to replicate the evolution of forces developed at the cutter-rock interface. In addition, a lumped thermal capacitance approach was used to investigate heating of the cutter caused by friction. The application also took full advantage of *PFC's* multi-threaded capabilities and was successful in modeling a large assembly of particles each of which represented a true 50 µm diameter sandstone grain. The validity of the model was established from physical rock-cutting tests on sandstone. The evolutions of cutter forces compared well with experimental data and the rock cutting environment proved to be a useful tool.

Underground Transit Station in a Jointed Rock Mass subjected to Parking Ramp Loads — Geotechnical engineer responsible for the design and numerical modeling. The project was headed by the Minneapolis Airport Commission with design and modeling was carried out by ITASCA Minneapolis. The project included a highly detailed three-dimensional jointed rock model using the software *3DEC*. The numerical model included an underground light-rail transit-hub that was analyzed for ceiling and wall failure when subjected to loading developed by the construction of a parking ramp. The model was calibrated to historical ceiling defection data during the construction of the transit-hub. After calibration, the model was forward analyzed by considering several different loading scenarios that would provide the safest and most cost-effective design to construct the parking ramp. The final recommended design included a load transfer beam spanning the width of the transit-hub as well as rock bolts anchored into the ceiling.

Geotechnical Engineer for a Large Underground Cu-Ni-PG Mine — Geotechnical engineer responsible for the conceptual and prefeasibility design. The project included determination of in-situ stresses from borehole breakout data, historical and statistical measurements of the in-situ stress field, ATV logging, core logging, mine design, and numerical modeling with finite difference and finite element codes.

Operating Systems

Windows OS, Linux - Ubuntu

Software

Numerical Modeling: *FLAC, FLAC3D, UDEC, 3DEC, PFC Suite*
Scientific: *MatLab, LabVIEW, Mathmatica*
Other: *TortoiseSVN, MS Office*
Computer-Aided Design: *Google SketchUp, Rhinoceros 5*