

**Modelling Cu-Ni-PGE vein arrays within an Offset Dyke environment of the Sudbury Igneous Complex.****John S. Fedorowich, and Chris O'Connor, Itasca Consulting Canada Inc.**

Arrays of Cu-Ni-PGE veins are found within Offset Dykes in the footwall to the Sudbury Igneous Complex, and present an important resource for mining over the last century. The chalcopyrite vein systems have three main elements: 1) a set of discrete failure surfaces which ultimately open as veins; 2) sets of shear fractures and small faults that extend from and are interconnected with the veins demonstrably controlling the vein openings, and 3) fluid over-pressuring as demonstrated by vein geometries.

From their arrangement, shapes, and spacing relationships it is thought that the chalcopyrite arrays are tectonic veins associated with small fault displacements, which were active in the late stages of dyke emplacement. In order to test this hypothesis and to provide an independent measure of vein patterns, a numerical modelling experiment was carried out using the Universal Discrete Element Code (UDEEC). Vein simulations were performed in fully coupled mechanical-hydraulic analysis in two orientations; longitudinal and transverse to a vein array. Applied paleostress orientations for the models were obtained from the orientation distribution and shear sense of the small faults that control veins.

Results of the modeling and comparison with vein patterns from various Sudbury deposits are presented.