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## **Pavel Vasak, M.Sc., P.Eng.**

Pavel is a Licensed Professional Engineer in the Province of Ontario. His education is in both the earth sciences and engineering disciplines. He moved to Sudbury in 1991 to join the Geomechanics Research Centre and has worked on research and consulting projects ranging from resource modelling, earth modelling and numerical modelling to mining-induced seismicity and rockbursts. He actively uses the Laurentian University Virtual Reality Laboratory (VRL) to develop novel scientific visualization tools for geomechanics while pursuing a PhD in Mineral Resources Engineering.

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### **Education**

PhD Candidate	Present
Natural Resources Engineering, Laurentian University, Sudbury, Ontario, Canada	
Master of Science	1992
Earth Sciences, Engineering Geology, University of Waterloo, Waterloo	
Bachelor of Applied Science	1989
Geological Engineering, University of Waterloo, Waterloo, Ontario	
Bachelor of Science	1985
Geology, Brock University, St. Catharines, Ontario, Canada	

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### **Employment History**

Research Engineer	January 2000 – present
Geomechanics Research Centre, MIRARCO – Mining Innovation, Sudbury, Ontario, Canada	
Geological Engineer	January – December 1999
Applied Geomechanics And Earth Sciences, Sudbury, Ontario, Canada	
Field Engineer	September 1995 – December 1998
Neumann Engineering And Mining Services Inc., Kingston, Ontario, Canada	
Research Engineer	November 1991 to August 1995
Geomechanics Research Centre, Laurentian University, Sudbury, Ontario	
Co-op Work Terms	1986– 1988
Junior geologist positions for the following:	
<ul style="list-style-type: none"><li>• Drilling program, Nunavut, Canada, unconformity-type uranium mine feasibility study.</li><li>• Field mapping, Archean Greenstone Belt (gold) and alkali igneous complex (PGE).</li><li>• Geological Survey of Canada, Airborne Radiometric Survey.</li></ul>	



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## Research Interests

Exploration geology, engineering scale structural geology, rock mechanics, 3D numerical modelling, mining-induced seismicity, rockbursts, geo-science and geo-engineering data integration, scientific visualization, virtual reality applications and software development.

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## Professional Affiliations

Professional Engineers Ontario (PEO)  
International Society for Rock Mechanics (ISRM)  
Canadian Institute of Mining, Metallurgy and Petroleum (CIM), Student Member  
Prospectors and Developers Association of Canada (PDAC), Student Member

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## Selected Projects

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| <b>2010</b>      | Mining-induced Seismic Periodicity and Major Rockburst Occurrences at Creighton Mine. Investigation periodic trends and temporal rockburst associations in the seismic record.                                                                                                                                     |
| <b>2009</b>      | Development, site implementation and calibration of Seismic Hazard Assessment Maps. Productivity Enhancement and Risk Management (PERM) for Underground Construction project. Installation of virtual reality facility at Creighton Mine in Sudbury, Ontario. Training of ground control staff.                    |
| <b>2007-2010</b> | Mining-induced Seismicity - Hazard Assessment and Mitigation for Deep Mining at Creighton Mine, Vale. NSERC, PhD thesis work.                                                                                                                                                                                      |
| <b>2006-2008</b> | Resource Modeller; various geostatistical mineral resource block modeling using kriging and unfolding methods for nickel and gold properties. Application of virtual reality for improved mineral delineation and drill hole targeting.                                                                            |
| <b>2005</b>      | Integrated 3D geoscientific deposit modeling for enhanced mineral prospectivity in the Abitibi Greenstone Belt, Northeastern Ontario. Developing individual 3D geo-referenced models of existing Abitibi mineral deposits (gold and VMS) from data provided by the participating mining and exploration companies. |
| <b>2000-2005</b> | Software Development Specialist (Geomechanics and exploration): Development and implementation of software projects focusing on 3D data interpretation at the Virtual Reality Laboratory at Laurentian University.                                                                                                 |

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## Publications

### Conference Proceedings

**Vasak, P.**, 2010, Implementation of mining-induced microseismic hazard maps at Creighton Mine for risk assessment of rockmass damage due to mining at depth. CIM-MEMO 2010 Conference and Trade Show, October 24 to 27, Sudbury, Ontario, 8 p.



- Vasak, P.** and Suorineni, F.T., 2010. Extracting more value from mine data using virtual reality and scientific visualization techniques. UMaT 1st Mining & Mineral Conference, University of Mines and Technology, Tarkwa, Ghana, 4 to 7 August, 2010, 15 p.
- Kaiser, P. K., S. Maloney, **P. Vasak** and G. Wang, 2009. Seismic excavation hazard evaluation in underground construction. 7th RaSiM6, Dalian, China, 1-26.
- P. Vasak** and A. Dasys, 2009. Research to reality: Application of mining-induced seismic hazard maps. ROCKENG09: Proceedings of the 3rd CANUS Rock Mechanics Symposium, Toronto, 10p.
- P. Vasak**, A. Dasys, F. Malek and D. Thibodeau. 2008. Extracting more value from complex monitoring data – Seismic Excavation Hazard Maps. Strategic vs Tactical Approaches in Mining 2008, Quebec City, Canada.
- Kaiser, P.K, **Vasak, P.**, Suorineni, F.T. and Thibodeau, D., 2005. New dimensions in seismic data interpretation with 3-D virtual reality visualization in burst-prone mines. Sixth International Symposium on Rockburst and Seismicity in Mines (RaSiM6), Perth, Western Australia, March 2005.
- Vasak P.**, Suorineni, F.T., Kaiser, P.K. and Thibodeau, D., 2004. Hazard map approach using space-time clustering analysis of mining-induced microseismicity. CIM Edmonton 2004, Edmonton, Alberta, May 9-12, 8p.
- Kazakidis. V.N and **Vasak, P.**, 2000. Sensitivity Analysis For Stability Assessment In The Design Of Underground Mine Openings. CIM Mining Millennium 2000.
- Vasak, P.**, and Kaiser, P.K., 1995. Tunnel Stability Assessment during rockbursts. CAMI '95, 3rd Canadian Conference on Computer Applications in the Mineral Industry, Montreal, Quebec, October 22-25, 10 p.

### Special Sessions & Presentations

- Vasak, P.**, Seismic Hazard. Virtual reality demonstration, Executive Briefing Centre, Golder-Mirarco Virtual Reality Studio, Toronto, Ontario, 13 May 2009.
- Vasak, P.**, Application of Virtual Reality in Mining-induced Seismicity Research, Engineering Seminar Presentation, Laurentian University, 27 March 2008, Sudbury, Ontario.
- Vasak, P.** and Thibodeau, D., 2003. Seismicity Used to Identify and Monitor Active Weakness Planes in Relation to Hazard Assessment. Eastern Section Annual Meeting, Seismological Society of America, 19-21 October, University of Toronto, Ontario, Canada.
- Public Virtual Reality Tour of Creighton Mine for INCO Ltd's 100 year celebrations. Laurentian University's Virtual Reality Laboratory, Willet Green Miller Centre, Sudbury, Ontario, June 8, 2002.

### Theses

- Vasak, P.**, 2011. Spatiotemporal seismic indicators for mining-induced rock mass damage propagation. Ph.D. Thesis, Laurentian University, Sudbury, Canada, in preparation.
- Vasak, P.**, 1992. Semi-Analytic Solution for the Steady-State Closure of an Opening in Saltrock. M.Sc. Thesis, University of Waterloo, Ontario, Canada, 130p.