

REFERENCES

- Badger, T.C. and Lowell, S. 1992. Rockfall Control Washington State. In Rockfall Prediction and Control and Landslide Case Histories, Transportation Research Record, National Research Council, Washington, No 1342, 14-19.
- Barton, N.R., Lien, R. and Lunde, J. 1974. Engineering classification of rock masses for the design of tunnel support. *Rock Mech.* 6(4), 189-239.
- Besl, P. J. and McKay, N. D., 1992. A method for registration of 3-D shapes. *IEEE Transactions on Pattern Recognition and Machine Intelligence* 14(2), pp. 239–256.
- Bieniawski, Z.T. 1989. Engineering rock mass classifications. New York: Wiley.
- Blythe, D. 1999. Advanced Graphics Programming Techniques Using OpenGL. Siggraph 1999, <http://www.opengl.org/resources/code/samples/sig99/advanced99/notes/notes.html>
- CDOT. 2005. I-70 Georgetown Incline Rockfall Mitigation Feasibility Study, Yeh and Associates Project NO. 24-100, prepared for Colorado Dept. Transportation.
- Donovan, J., Kemeny, J., and J. Handy. 2005, The Application of Three-Dimensional Imaging to Rock Discontinuity Characterization, Alaska Rocks 2005: The 40th U.S. Symposium on Rock Mechanics, Anchorage, AL.
- Einstein, H. 1993. Modern Developments in Discontinuity Analysis – the Persistence-Connectivity Problem, In *Comprehensive Rock Engineering, Principles, Practice, & Projects. Volume 3: Rock Testing and Site Characterization*, pp. 193-213, Oxford, Pergamon Press.
- Faugeras, O. 1996. Three Dimensional Computer Vision: A Geometrical Viewpoint, The MIT Press, Cambridge, Mass.
- Gonzalez, R. C. and P. Wintz. 1987. Digital image processing, 2 edn. Addison-Wesley, Boston.
- Goodman, R. 1989. Rock Mechanics, 2nd ed., Wiley.
- Goodman, R. and S. Kieffer. 2000. Behavior of rock in slopes, *J. Geotech. Geoenv. Eng.*, Vol. 126, No. 8, pp. 675-684.
- Gupta, N., R. Dahmani, M. Gottlieb, L. Denes, B. Kaminsky, P. Metes, 1999. Hyperspectral imaging using acousto-optical tunable filters. In *Proceedings of SPIE*, v. 3718, 10.
- Hadjigeorgiou, J., Lemy, F., Co te', P., and X. Maldague. 2003. An Evaluation of Image Analysis Algorithms for Constructing Discontinuity Trace Maps *Rock Mech. Rock Engng.*, 36 (2), 163–179.
- Haneberg, W.C. 2007. Directional roughness profiles from three-dimensional photogrammetric or laser scanner point clouds, *Proceedings 1st Canada-U.S. Rock Mechanics Symposium*, Vancouver, B.C., 27-31 May, pp. 101-106.
- Henwood, J., DeMarco, M., and C. Martinez. 2006. Shrink and Swell Estimation: Practices and Procedures, 57th Annual Highway Geology Symposium, Breckenridge, CO.
- Hoek, E. 2007. Practical Rock Engineering, <http://www.roscience.com/hoek/PracticalRockEngineering.asp>
- Hudson, J. and J. Harrison. 2000. Engineering Rock Mechanics. Pergamon Press, 896 pages.
- IBM. 2006. Mashups: The new breed of Web app. An introduction to mashups, <http://www.ibm.com/developerworks/xml/library/x-mashups.html>
- Jaboyedoff, M., Metzger, R., Oppikofer, T., Couture, R., Derron, M., Locat, J., and D. Turmel. 2007. New insight techniques to analyze rock slope relief using DEM and 3D imaging cloud points: COLTOP-3D software, *Proceedings 1st Canada-U.S. Rock Mechanics Symposium*, Vancouver, B.C., 27-31 May, pp. 61-68.

- Kemeny, J. and Post, R. 2003. Estimating Three-Dimensional Rock Discontinuity Orientation from Digital Images of Fracture Traces, *Computers & Geosciences*, 29/1, pp. 65-77.
- Kemeny, J., Norton, B. and K. Turner. 2006a. Rock Slope Stability Analysis Using Ground-Based LiDAR and Digital Image Processing, *Felsbau – Rock and Soil Engineering*, Nr. 3/06, pp 8-15.
- Kemeny, J. 2003. The Time-Dependent Reduction of Sliding Cohesion due to Rock Bridges Along Discontinuities: A Fracture Mechanics Approach, *Rock Mechanics and Rock Engineering*, Volume 36/1, pp. 27-38.
- Kemeny, J., Monte, J., Handy, J. and S. Thiam. 2003. The use of digital imaging and laser scanning technologies in rock engineering. *International Symposium on the Fusion Technology of Geosystem Engineering, Rock Engineering and Geophysical Exploration*, Seoul, Korea, Nov. 18-19.
- Kemeny, J. 2005. Time dependent drift degradation due to the progressive failure of rock bridges along discontinuities, *Int. J. Rock Mech. Min. Sci.*, Vol 42, pp 35-46.
- Kemeny, J., Turner, K. and B. Norton. 2006b. LiDAR for Rock Mass Characterization: Hardware, Software, Accuracy and Best-Practices, *Proceedings of the Workshop on Laser and Photogrammetric Methods For Rock Mass Characterization: Exploring New Opportunities*, Golden, CO.
- Kemeny, J., Donovan, J. and C. Rodríguez. 2006c. Application of Ground-Based LiDAR for Pre-Blast Rock Mass Characterization, *Proceedings of Fragblast 8, the 8th International Conference on Fragmentation by Blasting*, Santiago, Chile.
- Kemeny, J., Mofya, E. and J. Handy. 2003. The use of digital imaging and laser scanning technologies for field rock fracture characterization, *Proceedings of Soil and Rock America 2003 (12th PanAmerican Conference on Soil Mechanics and Geotechnical Engineering and the 39th US Rock Mechanics Symposium)*, Eds. J. Culligan, H. Einstein, A. White, Massachusetts Institute of Technology, Cambridge, MA, pp. 117-122.
- Kottenstette, J.T. 2005. Measurement of Geologic Features using Close Range Terrestrial Photogrammetry, *The 40th U.S. Symposium on Rock Mechanics (USRMS): Rock Mechanics for Energy, Mineral and Infrastructure Development in the Northern Regions*, held in Anchorage, Alaska, June 25-29, 2005.
- Monte, J. 2004. Rock mass characterization using laser scanning and digital imaging data collection techniques, M.S. Thesis, University of Arizona.
- Nasrallah, J. 2007. Rock slope stability and monitoring using 3D laser scanners and digital imaging, M.S. Thesis, University of Arizona.
- Nicholas, D.E. and D.B. Sims. 2001. Collecting and using geologic structure data for slope design, in *Slope Stability in Surface Mining*, ed. by W.A. Hustrulid, M.K. McCarter and D.J.A. Van Zyl, SME, Littleton, CO, pp11-26.
- Pack, R.T., Boie, K. (2002) Utah rockfall hazards inventory Phase I. Utah Department of transportation Research Division, Report No. UT-03.01.
- Patterson, K., Andrew. R., Ortiz, T. 2002. Rockfall hazard and evaluation methods, the Georgetown incline, Colorado. *Geological Society of America, Rocky Mountain Section 54th Annual Meeting*, May 7-9.
- Patton F.D. 1966. Multiple modes of shear failure in rock. In: *Proc First Cong Int Soc Rock Mech*, vol 1, Lisbon, p. 509-513.
- Pfeifer, N., Gorte, B., Oude Elberink, S. (2004): Influences of Vegetation on Laser Altimetry – Analysis and Correction Approaches. *The International archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*, Vol. XXXVII, Part 8/W2, pp. 283-287.

- POB. 2007. Point of Beginning, Scanning in Motion, by Mitchell Wimbush, September 1, 2007. http://www.pobonline.com/Articles/Features/BNP_GUID_9-5-2006_A_1000000000000159896
- POB. 2008 Point of Beginning 2008 Laser Scanner Survey, <http://laser.jadaproductions.net/>
- Pötsch, M., Schubert, W. and A. Gaich. 2005. Application of metric 3D images of rock faces for the determination of the response of rock slopes to excavation, EUROCK 2005, Brno, Czech. Rep.
- Priest, S. D. 1993. Discontinuity Analysis for Rock Engineering, London, Chapman & Hall
- Reshetyuk, Y. 2006. Investigation and calibration of pulsed time-of-flight terrestrial laser scanners, Licentiate thesis in Geodesy Royal Institute of Technology (KTH), Department of Transport and Economics, Division of Geodesy, Stockholm Sweden.
- Roberts, G. & Poropat, G. 2000. Highwall joint mapping in 3D at the Moura mine using using SIROJOINT. Bowen Basin Symposium 2000 Coal and Mining The New Millennium, Rockhampton, Oct. 2000.
- Rosser, N., Petley, D., and S. Dunning. 2007. The surface expression of strain accumulation in failing rock masses, Proceedings 1st Canada-U.S. Rock Mechanics Symposium, Vancouver, B.C., 27-31 May, pp. 113-120.
- Schuster, R.L., and R.W. Fleming. 1986. "Economic Losses and Fatalities Due to Landslides." Association of Engineering Geologists Bulletin. Vol. 23, No.1, pp. 11-28.
- Slob, S., Hack, H.R.G.K., van Knapen, B., Turner, K. and Kemeny, J. 2005. A method for automated discontinuity analysis of rock slopes with 3D laser scanning. In: Transportation Research Record, 1913(2005)1, pp. 187-208
- Slob, S., Hack, R., and K. Turner. 2002. An approach to automate discontinuity measurement of rock faces using laser scanning techniques, ISRM International Symposium on Rock Engineering for Mountainous Regions – Eurock 2002 Funchal, November 25-28th.
- Spar Point Research. 2007. SparView™ Vol. 5, No. 13, June 13, 2007 ISSN 1553-8834, <http://sparllc.com>
- Split Engineering LLC, www.spliteng.com
- Thiam, S. 2006. Integration of 2D digital images and 3D LiDAR scanning in rock design, M.S. Thesis, University of Arizona.
- Tse, R. and D. M. Cruden. 1979. Estimating joint roughness coefficients, Int. J. Rock Mech. Min. Sci., 16:303-307.
- Turner, K., Kemeny, J., Slob, S. & Hack, R. 2006. Evaluation and management of unstable rock slopes by 3D laser scanning, Proceedings of the 10th IAEG Congress, Nottingham, United Kingdom, 6-10 September 2006.
- Virtual Geomatics. 2008. www.virtualgeomatics.com

