

Charles Fairhurst — Publications

- Fairhurst, C. “Earth Resources Engineering,” *Hydraulic Fracturing J.*, **4**(1), 9-16 (January 2017).
- Fairhurst, C. “Grand Challenges in Earth Resources Engineering,” *Hydraulic Fracturing J.*, **4**(1), 32-35 (January 2017).
- Fairhurst, C. “Newton in the Underworld,” *Hydraulic Fracturing J.*, **4**(1), 101-102 (January 2017).
- Fairhurst, C. “The Observational Approach in Rock Engineering,” *Hydraulic Fracturing J.*, **4**(1), 36-41 (January 2017).
- Fairhurst, C. “Some Challenges of Deep Mining,” *Engineering*, **3**(4), 527-537 (August 2017), <https://doi.org/10.1016/J.ENG.2017.04.017>.
- Fairhurst, C. “Subsurface Engineering — More Than Rocket Science,” *Hydraulic Fracturing J.*, **4**(1), 8 (January 2017).
- Fairhurst, C. “Subsurface Engineering — A Path Forward,” *Hydraulic Fracturing J.*, **4**(2), 6-11 (January 2017).
- S. Dehkhoda and C. Fairhurst. “Rapid Excavation and Tunneling Techniques,” *Hydraulic Fracturing J.*, **4**(1), 32-35 (January 2017).
- Varun, C. Fairhurst, M. Pierce, H. Lager and P. Duffaut. “Underground Nuclear Power Plants: A Realistic Option?,” in *Energy Geotechnics: Proceedings of the 1st International Conference on Energy Geotechnics (ICEGT 2016, Kiel, Germany, August 29-31, 2016)*, pp. 663-672. F. Wuttke, S. Bauer and M. Sanchez, Eds. Boca Raton, Florida: CRC Press, 2016.
- M. P. Anderson and C. Fairhurst, Issue Editors. “Emerging Issues in Earth Resources Engineering,” *The Bridge* (National Academy of Engineering), **44**(1) (April 2014).
- Varun, M. Pierce and C. Fairhurst. “Underground Nuclear Power Plants. The Seismic Advantage,” in *Proceedings, ISRM 8th Asian Rock Mechanics Symposium (Sapporo, Japan, October 14-16, 2014)*, Paper No. 363.
- Fairhurst, C. “The Scratch Test — An Innovative and Inexpensive Method to Determine the Compressive Strength and Mohr-Coulomb Failure Envelope for Sedimentary Rock,” in *Proceedings, ISRM 8th Asian Rock Mechanics Symposium (Sapporo, Japan, October 14-16, 2014)*, ISRM-ARMS8-2014-048.
- Fairhurst, C. “Thinking Deeper,” *ARMA E-Newsletter*, **11**, 1-10 (Fall 2014).
- Fairhurst, C. “My Career in Rock Mechanics, Part Four: How I Came into Rock Mechanics (Conclusion),” *ARMA E-Newsletter*, **11**, 15-16 (Winter 2014).
- Fairhurst, C. “My Career in Rock Mechanics, Part Three: How I Came into Rock Mechanics,” *ARMA E-Newsletter*, **11**, 5-9 (Winter 2014).

Fairhurst, C. “My Career in Rock Mechanics, Part Two: How I Came into Rock Mechanics,” *ARMA E-Newsletter*, **10**, 5-11 (Fall 2013).

Fairhurst, C. “My Career in Rock Mechanics, Part One: “But it is only for eighteen months,” *ARMA E-Newsletter*, **9**, 5-10 (Spring 2013).

Arcscott, R. L., C. Fairhurst and L. Lake. “Grand Challenges for Earth Resources Engineering,” *J. Petrol Technol.*, 66-71 (June 2012).

Pettitt, W. S., M. Pierce, B. Damjanac, J. Hazzard, L. Lorig, C. Fairhurst, M. Sanchez-Nagel, N. Nagel, J. M. Reyes-Montes, J. Andrew and R. P. Young. “Fracture Network Engineering: Combining Microseismic Imaging and Hydrofracture Numerical Simulations,” in *46th US Rock Mechanics / Geomechanics Symposium (Proceedings, ARMA, Chicago, June 2012)*, Paper No. 12-554. Alexandria, Virginia: ARMA, 2012.

Pierce, M. E., and C. Fairhurst. “Synthetic Rock Mass Applications in Mass Mining,” in *Harmonising Rock Engineering and the Environment (Proceedings, 12th ISRM Int. Congress, Beijing, October 2011)*, pp. 109-114, Q. Qian and Y. Zhou, Eds. London: CRC Press, 2012.

Wilks, S. T., C. Fairhurst and J. F. Labuz. “Issues with Numerical Simulation of Core Disking,” in *46th US Rock Mechanics / Geomechanics Symposium (Chicago, June 2012)*, Paper No. 12-596. Alexandria, Virginia: ARMA, 2012.

Fairhurst, C. “Grand Challenges in Earth Resources Engineering — and Some Implications for Rock Mechanics and Rock Engineering,” in *Continuum and Distinct Element Modeling in Geomechanics — 2011 (Proceedings, 2nd International FLAC/DEM Symposium, Melbourne, February 2011)*, Keynote Lecture, Paper 01-01, pp. 3-10. D. Sainsbury et al., Eds. Minneapolis: Itasca International Inc., 2011

Pettitt, W., M. Pierce, B. Damjanac, J. Hazzard, L. Lorig, C. Fairhurst, I. Gil, M. Sanchez, N. Nagel, J. Reyes-Montes and R. P. Young. “Fracture Network Engineering for Hydraulic Fracturing,” *The Leading Edge*, **30**(8), 844-853, doi 10.1190/1.3626490 (2011).

Fairhurst, C. “Vienna-Leopold Müller Lecture: What is the Strength of a Rock Mass? — Progress in Answering Müller’s (Implicit) Question,” in *5th Colloquium on Rock Mechanics — Theory and Practice (Proceedings, Vienna, November 2010)*, pp. 87-110. E. Tentschert and R. Poisel, Eds. Vienna: Technische Universität Wien, 2010.

Damjanac, B., and C. Fairhurst. “Evidence for a Long-Term Strength Threshold in Crystalline Rock,” *Rock Mech. Rock Eng.*, **43**, 513-531 (2010).

Pettitt, W., M. Pierce, B. Damjanac, L. Lorig and C. Fairhurst. “Fracture Network Engineering and Enhanced Geothermal Systems,” *Geoth. Res. T.*, **34**, 419-426 (2010).

Fairhurst, C. “Rock Mechanics and Conservation of Sites: Natural, Ancient and Modern,” *ISRM News. J.*, **11**, 88-89 (2008).

Elsworth, D., and C. Fairhurst. "Some Opportunities for Science and Engineering at DUSEL," in *Rock Mechanics: Meeting Society's Challenges and Demands (1st Canada-U.S. Rock Mechanics Symposium, Vancouver, May 2007)*, Vol. 2: *Case Histories*, pp. 1085-1090. E. Eberhardt et al., Eds. London: Taylor & Francis Group, 2007.

Fairhurst, C., B. Damjanac and T. Brandshaug. "Rock Mass Strength and Numerical 'Experiments'," in *Publications of the Geotechnical Institute No. 2006-5, Proceedings 35 (Geomechanics Colloquium, November 2006)*, pp. 1-20. Freiberg: Technical University Mining Academy Freiberg, 2007.

Mas Ivars, D., N. Deisman, M. Pierce and C. Fairhurst. "The Synthetic Rock Mass Approach — A Step Forward in the Characterization of Jointed Rock Masses," in *The Second Half Century of Rock Mechanics (11th Congress of the International Society for Rock Mechanics, Lisbon, July 2007)*, Vol. 1, pp. 485-490. L. Ribeiro e Sousa et al. Eds. London: Taylor & Francis Group, 2007.

Fairhurst, C. "Fundamental Considerations Relating to the Strength of Rock," *Veröff. Inst. Bodenmechanik und Felsmechanik (Karlsruhe)*, **55**, 1-56 (1972); in *Report of the Workshop on Extreme Ground Motions at Yucca Mountain, August 23-25, 2004*, U.S. Geological Survey, USGS Open-File Report 2006-1277, T. C. Hanks et al., Eds. Reston, Virginia: USGS, 2006.

Fairhurst, C. "Nuclear Waste Disposal and Rock Mechanics: Contributions of the Underground Research Laboratory (URL), Pinawa, Manitoba, Canada," *Int. J. Rock Mech. Min. Sci.*, **41**, 1221-1227 (2004).

Fairhurst, C. "Radioactive Waste Isolation — One Small Step for Geology; One Giant Leap for Rock Mechanics," Leopold Muller Award Presentation, 10th International ISRM Congress, Johannesburg, September 2003.

Fairhurst, C. "Stress Estimation in Rock: A Brief History and Review," *Int. J. Rock Mech. & Min. Sci.*, **40**, 957-973 (2003).

Fairhurst, C., and C. Carranza-Torres. "Closing the Circle — Some Comments on Design Procedures for Tunnel Supports in Rock," in *Proceedings of the University of Minnesota 50th Annual Geotechnical Conference (February 2002)*, pp. 21-84. J. F. Labuz and J. G. Bentler, Eds. Minneapolis: University of Minnesota, 2002.

Carranza-Torres, C., and C. Fairhurst. "Aplicación del Método de Convergencia-Confinamiento al Diseño de Túneles en Macizos Rocosos Que Satisfacen el Criterio de Rotura de Hoek y Brown," in *IngeoTÚNELES*, pp. 69-123. C. López-Jimeno, Ed. Tunnelling Engineering Series, Vol. 4. Madrid: Escuela Técnica Superior de Ingenieros de Minas, 2001.

Fairhurst, C. "Rock Mechanics of Underground Nuclear Explosions," *ISRM News J.*, **6**(3), 21-27 (2001).

Carranza-Torres, C., and C. Fairhurst. "Analysis of Tunnel Support Requirements Using the Convergence-Confinement Method and the Hoek-Brown Rock Failure Criterion," in *GeoEng 2000 (Proceedings of the International Conference on Geotechnical & Geological Engineering, Melbourne, November 2000)*, Paper UW1244. Lancaster, Pennsylvania: Technomic Publishing, 2000.

Carranza-Torres, C., and C. Fairhurst. "Application of the Convergence-Confinement Method of Tunnel Design to Rock Masses That Satisfy the Hoek-Brown Failure Criterion," *Tunn. & Underground Space Tech.*, **15**(2), 187-213 (2000).

Carranza-Torres, C., and C. Fairhurst. "Some Consequences of Inelastic Rock-Mass Deformation on the Tunnel Support Loads Predicted by the Einstein and Schwartz Design Approach," in *Trends in Rock Mechanics (Proceedings of Sessions of Geo-Denver 2000)*, pp. 16-49. J. F. Labuz et al., Ed. Reston, Virginia: ASCE, 2000.

Damjanac, B., and C. Fairhurst. "Ecoulement Tri-Dimensionnel d'Eau Sous Pression dans les Milieux Fracturés," in *La Sécurité Des Grands Ouvrages, Hommage À Pierre Londe*, pp. 5-19. Paris: Presses Pontes et Chauseés, 2000.

Hart, R., and C. Fairhurst. "Application of Discontinuum Modeling in Geotechnical Studies for Nuclear Waste Isolation," in *Geoecology and Computers (Proceedings of the 3rd International Conference on Advances of Computer Methods in Geotechnical and Geoenvironmental Engineering, Moscow, February 2000)*, pp. 15-28. S. A. Yufin, Ed. Rotterdam: Balkema, 2000.

Fairhurst, C. "Structural and Hydrological Consequences of Underground Nuclear Testing on the Atolls of Mururoa and Fangataufa, in French Polynesia," presented at the GeoEng 2000, Melbourne, Australia, November 2000.

Fairhurst, C., B. Damjanac and R. Hart. "Numerical Analysis as a Practical Design Tool in Geo Engineering," in *Slope Stability 2000 (Proceedings of Sessions of Geo-Denver 2000)*, pp. 169-183. D. V. Griffiths, G. A. Fenton, and T. R. Martin, Eds. Reston, Virginia: ASCE, 2000.

Carranza-Torres, C., and C. Fairhurst. "Elasto-Plastic Analysis of Elliptical Cavities in Rock Subject to Non-Hydrostatic Loading," in *FLAC and Numerical Modeling in Geomechanics (Proceedings of the Conference, Minneapolis, September 1999)*, pp. 215-223. C. Detournay and R. Hart, Eds. Rotterdam: Balkema, 1999.

Carranza-Torres, C., and C. Fairhurst. "The Elasto-Plastic Response of Underground Excavations in Rock Masses That Satisfy the Hoek-Brown Failure Criterion," *Int. J. Rock Mech. & Min. Sci.*, **36**, 777-809 (1999).

Damjanac, B., C. Fairhurst and T. Brandshaug. "Numerical Simulation of the Effects of Heating on the Permeability of a Jointed Rock Mass," in *Proceedings of the 9th ISRM Congress on Rock Mechanics*. Paris, Vol. 2, pp. 881-885. Rotterdam: Balkema, 1999.

Fairhurst, C. "Rock Mechanics and Nuclear Waste Repositories (Keynote Paper)," in *Proceedings of the International Workshop on the Rock Mechanics of Nuclear Waste Repositories (Vail, Colorado, June 1998)*, pp. 1-45. S. Saeb and C. Francke, Eds. Alexandria, Virginia: ARMA, 1999.

Fairhurst, C. "Some Recent Developments at Yucca Mountain, USA with Comments on Repository Design," in *Actes Des Journées Scientifiques ANDRA 1999 (Nancy, France, December 7-9, 1999)*, pp. 463-480. Les Ulis: EDP Sciences, 1999.

Fairhurst, C., and B. Damjanac. "The Excavation Damage Zone — An International Perspective," in *Distinct Element Modeling in Geomechanics*, pp. 1-26. V. M. Sharma et al., Eds. New Delhi: Oxford & IBH Publishing, 1999.

Fairhurst, C., and L. Lorig. "Improved Design in Rock and Soil Engineering with Numerical Modelling," in *Distinct Element Modelling in Geomechanics*, pp. 27-46. V. M. Sharma et al., Eds. New Delhi: Oxford & IBH Publishing, 1999.

International Geomechanical Commission (C. Fairhurst, E. T. Brown, G. de Marsily, E. Detournay, V. Nikolaevskiy, J.R.A. Pearson and L. Townley). *Underground Nuclear Testing in French Polynesia: Stability and Hydrology Issues*. Paris: La Documentation Française, 1999.

Fairhurst, C. "Closing the Gap between Theory and Reality in Rock Mechanics," presented at the Hong Kong University, Inaugural Dedication of the Rock Mechanics Laboratory, October 23, 1998.

Carranza-Torres, C., and C. Fairhurst. "A General Stability Criterion for Tunnels in Soft and Hard Ground," in *Tunnels for People (Proceedings of the 23rd General Assembly of the International Tunnelling Association, April 1997)*, pp. 29-35. J. Golser et al., Eds. Rotterdam: Balkema, 1997.

Carranza-Torres, C., and C. Fairhurst. "On the Stability of Tunnels Under Gravity Loading, with Post-Peak Softening of the Ground," *Int. J. Rock. Mech. & Min. Sci.*, **34**(3-4), Paper No. 075 (1997).

Carranza-Torres, C., C. Fairhurst and L. Lorig. "Insights on the Stability of Large Excavations from Analytical and Numerical Models," *Felsbau*, **15**(1), 45-63 (1997).

Fairhurst, C. "Geomaterials and Recent Developments in Micro-Mechanical Numerical Models," *ISRM News J.*, **4**(2), 11-14 (1997).

Fairhurst, C. "Rock Mechanics and Nuclear Waste Repositories," in *Proceedings of the International Symposium on Rock Support — Applied Solutions for Underground Structures (Lillehammer, Norway, June 1997)*, pp. 1-43. E. Broch et al., Ed. Oslo: Helli Grafisk, 1997.

Carranza-Torres, C., and C. Fairhurst. "Análisis de Estabilidad de una Falla Geológica con el Método de las Discontinuidades de los Desplazamientos (Analysis of the Stability of a Geological Fault Using the Displacement Discontinuity Method)," *Actas de la Asociación de Geología Aplicada a la Ingeniería*, **X**, 73-81 (1996).

Fairhurst, C., and B. Damjanac. "The Excavation Damage Zone — An International Perspective," in *Proceedings of the Excavation Disturbed Zone Workshop on Designing the Excavation Disturbed Zone for a Nuclear Repository in Hard Rock (Winnipeg, September 1996)*, pp. 4-14. J. B. Martino and C. D. Martin, Eds. Toronto: 1996 Int. Conf. on Deep Geological Disposal of Radioactive Waste, 1996.

Detournay, E., C. Fairhurst and J. Labuz. "A Model of Tensile Failure Initiation Under an Indentor," in *Mechanics of Jointed and Faulted Rock (Proceedings of the 2nd International Conference, Vienna, April 1995)*, Supplemental Volume, pp. 12-17. H.-P. Rossmanith, Ed. Rotterdam: Balkema, 1995.

Fairhurst, C. "Three Gorges Dam Reservoir, Yangtze River, China," *Felsbau*, **13**(6), 390-394 (1995).

Damjanac, B., and C. Fairhurst. "A Note on Modelling of the Groundwater Flow and Pressure Behaviour Observed During Excavation of the SCV Drift in the Stripa Project," in *In-Situ Experiments at the Stripa Mine (Proceedings of the Fourth International NEA/SKB Symposium, Stockholm, October 1992)*, pp. 437-446. Paris: Organisation for Economic Co-operation and Development, 1994.

Fakhimi, A. A., and C. Fairhurst. "A Model for the Time-Dependent Behavior of Rock," *Int. J. Rock Mech. Min. Sci. & Geomech. Abstr.*, **31**(2), 117-126 (1994).

Fairhurst, C. "Analysis and Design in Rock Mechanics: The General Context," in *Comprehensive Rock Engineering*, Vol. 2, pp. 1-29. J. A. Hudson, Ed. Oxford: Pergamon Press, 1993.

Fairhurst, C. "The Strength and Deformability of Rock Masses — An Important Research Need," in *Safety and Environmental Issues in Rock Engineering (Proceedings of EUROCK '93, Lisbon, June 1993)*, Vol. 2, pp. 931-933. L. Sousa, E. Ribeiro, and N. F. Grossmann, Eds. Rotterdam: Balkema, 1993.

Fairhurst, C. "Evolving Towards 'Mechanics Based' Design Procedures in Geomechanics (Abstract)," in *Proceedings of the 1992 Rock Engineering Symposium in Taiwan (Tainan, Republic of China, December 1992)*, p. 1. S. T. Chen et al., Eds. Tainan, Taiwan: National Cheng Kung University, 1992.

Lorig, L., and C. Fairhurst. "Three-Dimensional Discontinuum Modeling for Underground Excavations," in *Proceedings of the 1992 Rock Engineering Symposium in Taiwan (Tainan, Republic of China, December 1992)*, pp. 349-358. S.-T. Chen et al., Eds. Tainan, Taiwan: National Cheng Kung University, 1992.

Douat, C., and C. Fairhurst. "Micro-Computer Modelling and Practical Design/Monitoring of Large Underground Excavations," in *Static and Dynamic Considerations in Rock Engineering*, pp. 113-124. R. K. Brummer, Ed. Rotterdam: Balkema, 1990.

Fairhurst, C. "Design of Excavations in High Rock-Stress Conditions," in *Rockbursts and Seismicity in Mines (Proceedings of the 2nd International Symposium, Minneapolis, June 1988)*, pp. 421-423. C. Fairhurst, Ed. Rotterdam: Balkema, 1990.

Fairhurst, C. "General Report: Deformation, Yield, Rupture and Stability of Excavations at Depth in Rock," in *Rock at Great Depth*, Vol. 3, pp. 1103-1114. Rotterdam: Balkema, 1990.

Fairhurst, C., Ed. *Rockbursts and Seismicity in Mines (Proceedings of the 2nd International Symposium, Minneapolis, June 1988)*. Rotterdam: Balkema, 1990.

Fairhurst, C., and J. Pei. "A Comparison between the Distinct Element Method and the Finite Element Method for Analysis of the Stability of an Excavation in Jointed Rock," *Tunn. & Underground Space Tech.*, **5**(1/2), 111-117 (1990).

Sellami, H., C. Fairhurst, E. Deliac and B. Delbast. "The Role of in-Situ Rock Stresses and Mud Pressure on the Penetration Rate of PDC Bits," in *Proceedings of the International Symposium on Mechanics and Physics of Rocks at Great Depths*, Vol. 2, pp. 769-777. Pau, France: ISRM, 1989.

Fairhurst, C. "Some Observations on the Practical Utility and Limitations of Excavation Stability Analysis," in *Underground Engineering 1988*, Vol. 1, pp. 27-32. Dhanbad, India: Central Mining Research Station, 1988.

Fairhurst, C., and J. Lemos. "Influence of In-Situ Stresses on Fluid Penetration in Jointed Rock from Unlined Pressure Tunnels," presented at the ISRM Symposium on Rock Mechanics and Power Plants, Madrid, September 1988.

Lin, D., and C. Fairhurst. "Application of Animated Graphics in the Analysis of Large Scale Blocky Rock System around Excavations," in *Key Questions in Rock Mechanics (Proceedings of the 29th U.S. Symposium, University of Minnesota)*, pp. 755-757. P. A. Cundall et al., Ed. Rotterdam: Balkema, 1988.

Lin, D., and C. Fairhurst. "Static Analysis of the Stability of Three-Dimensional Blocky Systems around Excavations in Rock," *Int. J. Rock Mech. Min. Sci. & Geomech. Abstr.*, **25**(3), 139-148 (1988).

Detournay, E., and C. Fairhurst. "A Two-Dimensional Elastoplastic Analysis of a Long, Cylindrical Cavity under Non-Hydrostatic Loading," *Int. J. Rock Mech. Min. Sci. & Geomech. Abstr.*, **24**(4), 197-211 (1987).

Fairhurst, C. "Comments on the Modeling of Coupled Thermo-Mechanical-Fluid Flow Behavior of Rock Masses," in *Coupled Processes Associated with Nuclear Waste Properties*, pp. 713-731. C. F. Tsang, Ed. Orlando: Academic Press, 1987.

Fairhurst, C., and R. D. Hart. "Verification and Validation of Coupled Mechanical/Water Flow Effects in Rock Masses: Some Possibilities and Limitations," in *GEOVAL-87 (Stockholm, April 1987)*, pp. 527-545. Stockholm: SKI, 1987.

Lin, D., C. Fairhurst and A. M. Starfield. "Geometrical Identification of Three-Dimensional Rock Block Systems Using Topological Techniques," *Int. J. Rock Mech. Min. Sci.*, **24**(6), 331-338 (1987).

Sterling, R. L., C. Fairhurst and J. C. Carmody. "Experience in the Development of Mined Underground Space in the Minneapolis-St. Paul Area," in *Proceedings of the International Symposium on Cities and Subsurface Use (Bordeaux, France, October 1987)*, pp. 63-66. Rotterdam: Balkema, 1987.

Cundall, P. A., and C. Fairhurst. "Correlation of Discontinuum Models with Physical Observations — An Approach to the Estimation of Rock Mass Behaviour," *Felsbau*, **4**(4), 197-202 (1986).

Fairhurst, C. “In-Situ Stress Determination — An Appraisal of Its Significance in Rock Mechanics,” in *Proceedings of the International Symposium on Rock Stress and Rock Stress Measurements (Stockholm, September 1986)*, pp. 3-17. O. Stephansson, Ed. Luleå: Centek, 1986.

Fairhurst, C., and D. Lin. “Fuzzy Methodology in Tunnel Support Design,” in *Research and Engineering Applications in Rock Masses (Proceedings of the 26th U.S. Symposium on Rock Mechanics, South Dakota School of Mines & Technology, Rapid City, June 1985)*, pp. 269-278, E. Ashworth, Ed. Boston: Balkema, 1985.

Fairhurst, C., and A. Maia da Costa. “Comparison of Numerical Modeling with Predictions from Laboratory Tests and Field Observations of Deformation in a Potash Mine in Sergipe, Brazil,” in *Research and Engineering Applications in Rock Masses*, pp. 269-278. Boston: Balkema, 1985.

St. John, C. M., E. Detournay and C. Fairhurst. “Design Charts for a Deep Circular Tunnel under Non-Hydrostatic Loading,” in *Rock Mechanics in Productivity and Protection (Proceedings of the 25th Symposium on Rock Mechanics, Northwestern University, June 1984)*, pp. 849-855. C. H. Dowding and M. M. Singh, Eds. New York: AIMMPE, 1984.

Board, M. P., and C. Fairhurst. “Rockburst Control Through Destressing — A Case Example,” in *Rockbursts: Prediction and Control (IMM/Inst. Mining Engineers Symposium, London, October 1983)*, pp. 91-101. London: Institute of Mining & Metallurgy, 1983.

Brady, B., and C. Fairhurst. “Rock Mechanics of Underground Excavations, General Report,” in *Proceedings of the 5th International Congress of Rock Mechanics (Melbourne, 1983)*. Victoria, Australia: Australian Geomechanics Society, 1983.

Fairhurst, C., and R. Sterling. “Subsurface Storage of Food (Session Report, U.N. Workshop on the Utilization of Subsurface Space in Developing Countries, Stockholm, 1982),” *Underground Space*, 7, 249-250 (1983).

Sterling, R. L., F. Dunkel, G. Meixel and C. Fairhurst. “Underground Storage of Food (U.N. Workshop on the Utilization of Subsurface Space in Developing Countries, Stockholm, 1982),” *Underground Space*, 7, 257-262 (1983).

Detournay, E., and C. Fairhurst. “Approximate Statical Solution of the Elastoplastic Interface in the Problem of an Infinite Medium with a Circular Hole,” in *Numerical Methods in Geomechanics (Proceedings of the 4th International Conference, Edmonton, Canada)*, pp. 27-35. Rotterdam: Balkema, 1982.

Detournay, E., and C. Fairhurst. “Generalization of the Ground Reaction Curve Concept,” in *Issues in Rock Mechanics (Proceedings of the 23rd Symposium on Rock Mechanics, University of California, Berkeley, August 1982)*, pp. 924-934. Littleton, Colorado: SME, 1982.

Fairhurst, C., and F. H. Cornet. “Rock Fracture and Fragmentation,” in *Rock Mechanics from Research to Application (Proceedings of the 22nd U.S. Symposium on Rock Mechanics, MIT, 1981)*, pp. 21-46. Cambridge: MIT, 1981.

Fairhurst, C. "Advantages of Earth-Sheltered Building and Current Developments in the United States," *Underground Space*, **5**(1), 31-35 (July 1980).

Fairhurst, C., and J. J. K. Daemen. "Practical Inferences from Research on the Design of Tunnel Supports," *Underground Space*, **4**(5), 297-311 (1980).

Fairhurst, C. F., C. M. St. John, N. F. Midea, S. M. Eston, A. C. Fernandes and L. A. Bongiovanni. "Rock Mechanics Studies of Proposed Underground Mining of Potash in Sergipe, Brazil," in *Proceedings of the 4th International Congress of Rock Mechanics (Montreux, Switzerland, 1979)*, pp. 131-137. Rotterdam: Balkema, 1979.

Voegele, M., C. Fairhurst and P. A. Cundall. "Analysis of Tunnel Support Loads Using the Distinct Block Model," in *Storage in Excavated Rock Caverns (Rockstore 77)*, Vol. 2, pp. 247-252. Oxford: Pergamon, 1978.

Cundall, P. A., M. D. Voegele and C. Fairhurst. "Computerized Design of Rock Slopes Using Interactive Graphics for the Input and Output of Geometrical Data," in *Design Methods in Rock Mechanics*, pp. 1-10. New York: ASCE, 1977.

Fairhurst, C., and S. L. Crouch, Eds. *Design Methods in Rock Mechanics (Proceedings of the 16th Symposium on Rock Mechanics, University of Minnesota, September 1975)*. New York: ASCE, 1977.

Fairhurst, C. "The Application of Mechanics to Rock Engineering," in *Proceedings of the Third Symposium on Engineering Application of Solid Mechanics (University of Toronto, June 1976)*, Vol. 2, pp. 123-162, B. Tabarrok, Ed. Toronto: University of Toronto, Faculty of Appl. Sci. & Eng./Canadian Soc. for Mech. Eng./Canadian Soc. for Civil Eng., 1976.

Fairhurst, C. "The Application of Mechanics to Rock Engineering (Invited Lecture)," in *Proceedings of the Symposium on Exploration for Rock Engineering (Johannesburg, November 1976)*, pp. 1-22. Rotterdam: Balkema, 1976.

Fairhurst, C. "Going Under to Stay on Top," *Underground Space*, **1**, 71-86 (1976).

Fairhurst, C. "Some Basic Considerations of Mechanics as Applied to Rock Mechanics (Abstract)," in *Proceedings of the 3rd Symposium on Engineering Application of Solid Mechanics (Toronto, June 1976)*, Summaries.

Fairhurst, C. "Hard Rock Blasting Developments and Possibilities," in *Conference: Bench Drilling Days (Atlas Copco, July 1975)*, p. 11.

Fairhurst, C. "Introduction to Alternatives in Energy Conservation: The Use of Earth Covered Buildings," in *Proceedings of Conference (Ft. Worth, July 1975)*, pp. 1-5.

Fairhurst, C. "The Work of the Underground Construction Research Council," in *Proceedings of the Symposium on the Development and Utilization of Underground Space (University of Missouri, Kansas City, March 1975)*, pp. 103-106. T. Stauffer Sr. and J. D. Vineyard, Eds. Washington: National Science Foundation, 1975.

Cornet, F., and C. Fairhurst. "Influence of Pore Pressure on the Deformation Behavior of Saturated Rocks," in *Proceedings of the 3rd International Congress on Rock Mechanics (Denver)*, Vol. II-A, pp. 638-644. Washington, D.C.: U.S. National Science, 1974.

Crouch, S. L., and C. Fairhurst. "Mechanics of Coal Mine Bumps," *Trans. Soc. Min. Engrs. A.I.M.E.*, **256**, 317-323 (1974).

Fairhurst, C., and B. Singh. "Roofbolting in Horizontally Laminated Rock," *Eng. Mining J.*, **175**(2), 80-90 (1974).

Fairhurst, C., and B. Singh. "Theoretical Studies of the Stability of a Bolted Bedded Mine Roof (in Polish)," *Przeglad Gorniczy*, **20**(1), 56-62 (1974).

Hardy, M. P., and C. Fairhurst. "Analysis of Fracture in Rock and Rock Masses," in *Engineering for Materials/Energy Challenge (Proceedings of the 14th Annual ASME Symposium, Albuquerque, February-March, 1974)*, pp. 73-80.

Hardy, M. P., S. L. Crouch, C. Fairhurst and K. P. Sinha. "A Hybrid Computer System Simulating Inelastic Seam Behavior," in *Advances in Rock Mechanics (Proceedings of the 3rd International Congress on Rock Mechanics, Denver, 1974)*, Vol. II-B, pp. 1015-1021. Washington, D.C.: U.S. National Academy of Science, 1974.

Crouch, S. L., and C. Fairhurst. "Analysis of Rock Mass Deformations Due to Excavations," in *Proceedings of the Rock Mechanics Symposium, ASME*, pp. 25-40. D. L. Sikarskie, Ed. New York: ASME, 1973.

Fairhurst, C. "Determination of Rock Stresses at Depth (Abstract)," in *Colloquium on Seismic Effects of Reservoir Impounding*. Royal Society, London, March 1973.

Fairhurst, C. "Laboratory Testing of Rock and Its Relevance to Mine Design," in *SME Mining Engineers' Handbook*, Vols. 1, pp. 13-36 – 13-51. I. A. Given, Ed. Baltimore: Port City Press, 1973.

Fairhurst, C. "A Look to 1980 and Beyond," in *Proceedings of the Symposium on Rock Mechanics (Dhanbad, India, July 1972)*, pp. 309-311. Calcutta: Institution of Engineers, 1973.

Fairhurst, C. "Mechanics of Stable and Unstable Rock Fracture, and the Influence of Pore Fluid Pressure (Abstract)," in *Colloquium on Seismic Effects of Reservoir Impounding*. Royal Society, London, March 1973.

Fairhurst, C., and M. P. Hardy. "Fracture in Rocks and Engineering Implications," in *Proceedings of the 3rd International Conference on Fracture (Munich 1973)*, p. PL IX 141.

Hardy, M. P., and C. Fairhurst. "Chip Formation by Drag Cutters," in *Proceedings of the 6th Society of Petroleum Engineers Conference on Drilling and Rock Mechanics (January 1973)*, SPE Pre-print 4244.

Hardy, M. P., S. L. Crouch and C. Fairhurst. "Hybrid Computer Analysis of Seam Extraction (Abstract)," in *New Horizons in Rock Mechanics (Proceedings of the 14th Symposium on Rock Mechanics, Pennsylvania State University, 1972)*, p. 749. H. R. Hardy Jr. and R. Stefanko, Eds. New York: ASCE, 1973.

Hardy, M. P., J. A. Hudson and C. Fairhurst. "The Failure of Rock Beams. Part I — Theoretical Studies. Derivation of Complete Force-Displacement Curve," *Int. J. Rock Mech. & Min. Sci.*, **10**(1), 53-67 (1973).

Hardy, M. P., J. A. Hudson and C. Fairhurst. "The Failure of Rock Beams. Part II — Experimental Studies. Closed-Loop Programmable Testing System for Plexiglas and Rock Beams," *Int. J. Rock Mech. & Min. Sci.*, **10**(1), 69-82 (1973).

Roegiers, J. C., and C. Fairhurst. "The Deep Stress Probe, A Tool for Stress Determination," in *New Horizons in Rock Mechanics (14th Symposium on Rock Mechanics, Pennsylvania State University, 1972)*, p. 755. H. R. Hardy Jr. and R. Stefanko, Eds. New York: ASCE, 1973.

Roegiers, J.-C., C. Fairhurst and R. B. Rosene. "The DSP, a New Instrument for Estimation of the in-Situ Stress State at Depth," in *Proceedings of the 6th Society of Petroleum Engineers Conference on Drilling and Rock Mechanics (January 1973)*, SPE Pre-print 4246.

Brown, E. T., J. A. Hudson, M. P. Hardy and C. Fairhurst. "Controlled Failure of Hollow Rock Cylinders in Uniaxial Compression," *Rock Mech.*, **4**(1), 1-24 (1972).

Cornet, F., and C. Fairhurst. "Variation of Pore Volume in Disintegrating Rock," in *Percolation Through Fissured Rock (Proceedings of the Symposium, Stuttgart, Germany, September 1972)*, pp. T2A, 1-8. Essen, Germany: Deutsche Gesellschaft, 1972.

Daemen, J., and C. Fairhurst. "Rock Failure and Tunnel Support Loading," in *International Symposium on Underground Openings (Luzern, Switzerland)*, pp. 356-369. Luzern: Swiss Society for Soil Mechanics and Foundation Engineering, 1972.

Fairhurst, C. "Estimation of Rock Mass Permeability by Hydraulic Fracturing, a Suggestion," presented at the Symposium on Percolation through Fissured Rock (Stuttgart, Germany, September 1972).

Hudson, J. A., E. T. Brown and C. Fairhurst. "Shape of the Complete Stress-Strain Curve for Rock," in *Stability of Rock Slopes (Proceedings of the 13th U.S. Symposium on Rock Mechanics, University of Illinois at Urbana, 1971)*, pp. 773-795. E. J. Cording, Ed. New York: ASCE, 1972.

Hudson, J. A., S. L. Crouch and C. Fairhurst. "Soft, Stiff and Servo-Controlled Machines," *Eng. Geol.*, **6**(2), 155-189 (1972).

Haimson, B. C., and C. Fairhurst. "Some Bit-Penetration Characteristics in Pink Tennessee Marble," in *Dynamic Rock Mechanics (12th Symposium on Rock Mechanics, Rolla, Missouri, 1970)*, pp. 547-559. E. B. Clark, Ed. New York: SME/AIMMPE, 1971.

Hudson, J. A., E. T. Brown and C. Fairhurst. "Optimizing the Control of Rock Failure in Servo-Controlled Laboratory Tests," *Int. J. Rock Mech.*, **3**(4), 217-224 (1971).

Hustrulid, W. A., and C. Fairhurst. "A Theoretical and Experimental Study of the Percussive Drilling of Rocks — Part I, Theory of Percussive Drilling," *Int. Rock Mech. & Min. Sci.*, **8**(4), 311-334 (1971).

Hustrulid, W. A., and C. Fairhurst. "A Theoretical and Experimental Study of the Percussive Drilling of Rocks — Part II, Force-Penetration of Specific Energy Determinations," *Int. Rock Mech. & Min. Sci.*, **8**(4), 335-356 (1971).

Hustrulid, W. A., and C. Fairhurst. "A Theoretical and Experimental Study of the Percussive Drilling of Rocks — Part III, Experimental Verification of the Mathematical Theory," *Int. Rock Mech. & Min. Sci.*, **9**(3), 417-429 (1971).

Hustrulid, W. A., and C. Fairhurst. "A Theoretical and Experimental Study of the Percussive Drilling of Rocks — Part IV, Application of the Model to Actual Percussive Drilling," *Int. Rock Mech. & Min. Sci.*, **9**(3), 431-449 (1971).

Kutter, H. K., and C. Fairhurst. "On the Fracture Process in Blasting," *Int. J. Rock Mech.*, **8**, 181-202 (1971).

Porter, D. D., and C. Fairhurst. "A Study of Crack Propagation Produced by the Sustained Borehole Pressure in Blasting," in *Dynamic Rock Mechanics (Proceedings of the 12th Symposium on Rock Mechanics, University of Missouri, Rolla, November 1970)*, pp. 497-515, G. B. Clark, Ed. New York: SME/AIMMPE, 1971.

Roegiers, J.-C., J. A. Hudson and C. Fairhurst. *A Note on Controlled Crack Growth in Hydraulic Fracturing of Rock*, University of Minnesota, MRRC Progress Report, No. 24, April 1971.

Daemen, J., and C. Fairhurst. "Influence of Inelastic Rock Properties on the Stability of a Wellbore," presented at the Society of Petroleum Engineers, 45th Annual Meeting, Houston, October 1970, SPE Preprint 3032, 1970.

Fairhurst, C. "Borehole Methods of Stress Determination," in *Proceedings of the International Symposium on Rock Mechanics (Madrid, October 1968)*, pp. 273-279. Madrid: Editorial Blume, 1970.

Fairhurst, C. "Comminution: Physical and Mechanical Bases of Comminution, Drilling, Blasting, Crushing, Grinding, Abrasion," presented at the 2nd Conference of the International Society for Rock Mechanics, Belgrade, 1970.

Fairhurst, C. "Fracture and Failure Mechanism of Rocks. Laboratory Tests on Rock Specimens," in *Proceedings of the 10th Congress of the International Bureau for Rock Mechanics (Leipzig, 1968)*, pp. 206-255. Berlin: Deutsche Ak. Wissensch. Akademie Verlag, 1970.

Haimson, B. C., and C. Fairhurst. "In-Situ Stress Determination at Great Depth by Means of Hydraulic Fracturing," in *Rock Mechanics — Theory & Practice (Proceedings of the 11th Symposium on Rock Mechanics, Berkeley, June 1969)*, pp. 559-584. W. H. Somerton, Ed. Littleton, CO: SME/AIME, 1970.

Rummel, F., and C. Fairhurst. "Determination of the Post Failure Behavior of Brittle Rock Using a Servo-Controlled Testing Machine," *Rock Mech.*, **2**(4), 189-204 (1970).

von Schonfeldt, H., and C. Fairhurst. "Field Experiments on Hydraulic Fracturing," presented at the Society of Petroleum Engineers, 45th Annual Meeting, Houston, October 1970, SPE Preprint 3033, 1970.

von Schonfeldt, H., and C. Fairhurst. "Open Hole Hydraulic Fracturing," in *Proceedings of the Third Symposium on Salt*, pp. 404-409. J. L. Rau and L. F. Dellwig, Eds. Cleveland: Northern Ohio Geological Society, 1970.

Wawersik, W., and C. Fairhurst. "A Study of Brittle Rock Fracture in Laboratory Compression Experiments," *Int. J. Rock Mech. Min. Sci.*, **7**(5), 561-575 (1970).

Bonnechere, F., and C. Fairhurst. "Determination of the Regional Stress Field from 'Doorstopper' Measurements," in *Proceedings of the International Symposium on Determination of Stresses (Lisbon, May 1969)*, pp. 307-333.

Bonnechere, F., and C. Fairhurst. "Results of an In-Situ Comparison of Different Techniques for Rock Stress Determination," in *Proceedings of the International Symposium on Determination of Stresses (Lisbon, May 1969)*, pp. 334-358.

Daemen, J., C. Fairhurst and A. M. Starfield. "Rational Design of Tunnel Supports," in *Proceedings of the 2nd Symposium on Rapid Excavation (Sacramento State College, 1969)*, Paper no. 2. H. L. Hartman, Ed. Sacramento, California: Sacramento State College, School of Engineering, 1969.

Haimson, B. C., and C. Fairhurst. "Hydraulic Fracturing in Porous Permeable Materials," *J. Petrol. Tech.*, **21**, 811-817 (July 1969).

Hudson, J. A., and C. Fairhurst. "Tensile Strength, Weibull's Theory and a General Statistical Approach to Rock Failure," in *Proceedings of the International Conference on Structure, Solid Mechanics and Engineering Design in Civil Engineering Materials (1969)*, Part II, pp. 901-914. M. Te'eni, Ed.

Bonnechere, F., and C. Fairhurst. "Determination of the Regional Stress Field from 'Door-Stopper' Measurements," *J. S. African Inst. Min. Metall.*, **68**(12), 520-544 (July 1968).

Kutter, H. K., and C. Fairhurst. "The Roles of Stress Wave and Gas Pressure in Presplitting," in *Status of Practical Rock Mechanics (Proceedings of the 9th Symposium of Rock Mechanics, Colorado School of Mines, April 1967)*, pp. 265-284. New York: AIMEM, 1968.

Starfield, A. M., and C. Fairhurst. "How High Speed Computers Advance Design of Practical Mine Pillar Systems," *Eng. & Mining J.*, **5**, 78-84 (May 1968).

Crouch, S. L., and C. Fairhurst. "A Four-Component Borehole Deformation Gauge for the Determination of in-Situ Stresses in Rock Masses," *Int. J. Rock Mech. Min. Sci.*, **4**, 209-217 (1967).

Fairhurst, C., Ed. *Failure and Breakage of Rocks (Proceedings of the 8th Symposium on Rock Mechanics, University of Minnesota, September 1966)*. New York: AIMM/PE, 1967.

Fairhurst, C. "Influence of Defects and Discontinuities on Deformation Behavior of Rocks," in *Proceedings — Soil Mechanics and Foundation Engineering Conference (15th Annual Conference, University of Minnesota 1967)*, pp. 18-41. Minneapolis: University of Minnesota, Dept. of Conferences & Institutes, 1967.

Fairhurst, C. *Methods of Determining in-Situ Rock Stresses at Great Depths*, U.S. Army Corps of Engineers, Missouri River Division, Under Contract DA-25-066-ENG-14, No. 1-68, December 1967.

Haimson, B. C., and C. Fairhurst. "A Criterion for Hydraulic Fracturing in Porous Rock," presented at the Fourth Conference on Drilling and Rock Mechanics, Austin, Texas, January 1967.

Haimson, B., and C. Fairhurst. "Initiation and Extension of Hydraulic Fractures in Rocks," *Soc. Petr. Engrg. J.*, **7**, 310-318 (1967).

Müller, L. Ed., (in collaboration with C. Fairhurst). *Rock Engineering in Theory and Practice*. Vienna: Springer-Verlag, 1967.

Pariseau, W. G., and C. Fairhurst. "The Force Penetration Characteristics for Wedge Penetration," *Int. J. Rock Mech. & Min. Sci.*, **4**(2), 165-180 (1967).

Berry, D. S., and C. Fairhurst. "Influence of Rock Anisotropy and Time Dependent Deformation on the Stress Relief and High Modulus Inclusion Techniques of In-Situ Stress Determination," in *Symposium on Testing Techniques for Rock Mechanics (Seattle, October 1965)*, ASTM Special Technical Publication N402, 1966.

Fairhurst, C. "Comminution," in *Proceedings of the First Congress of the International Society of Rock Mechanics (Lisbon, September-October, 1966)*, pp. 413-414. J. G. Zeitlen, Ed. Lisbon: LNEC, 1966.

Fairhurst, C. "Contribution to Discussion of Paper by E. F. Long, 'An Investigation Aimed at Improving the Efficiency of Drilling Rock by Percussion Drilling'," *J. S. African Inst. Min. Metall.*, **66**(12), 687-692 (July 1966).

Fairhurst, C. "Recent Drilling Research at the University of Minnesota," in *Proceedings of the 27th Annual Mining Symposium & 39th Annual Meeting of the Minnesota Section, AIME (University of Minnesota, 1966)*, pp. 165-169. E. P. Pfleider and F. E. Berger (assisted by D. A. Wallen), Eds.

Fairhurst, C. "The Role of Rock Mechanics," *Mining Eng.*, **18**(2), 90-92 (February 1966).

Fairhurst, C., and N. Cook. "The Phenomenon of Rock Splitting Parallel to the Direction of Maximum Compression in the Neighborhood of a Surface," in *Proceedings of the First Congress of the International Society of Rock Mechanics (Lisbon, September-October)*, Vol. 1, pp. 687-692. J. G. Zeitlen, Ed. Lisbon: LNEC, 1966.

Fairhurst, C. "On the Determination of the State of Stress in Rock Masses," in *Preprints of the Second Conference on Drilling and Rock Mechanics (College of Engineering, University of Texas, Austin, January 1965)*, SPE Paper 1062. Dallas: SPE, 1965.

Gnirk, P. F., and C. Fairhurst. "The Mechanics of Explosive Cavity Formation and Energy Dissipation," in *Proceedings of the 7th Symposium on Rock Mechanics (Pennsylvania State University, June 1965)*, pp. 382-406. SME, 1965.

Fairhurst, C. "Measurement of In-Situ Rock Stresses with Particular Reference to Hydraulic Fracturing," *Felsmechanik und Ingenieurgeologie*, **2**(3-4), 139-147 (1964).

Fairhurst, C. "On the Validity of the Brazilian Test for Brittle Materials," *Int. J. Rock Mech. & Min. Sci.*, **1**(4), 535-546 (1964).

Fairhurst, C., Trans. "Rock Pressure Calculations," English translation from French, original by J. Mandel. *Nottingham Univ. Mining Mag.*, 67-81 (1964).

Fairhurst, C., Ed. *Rock Mechanics (Proceedings of the Fifth Symposium on Rock Mechanics, University of Minnesota, May 1962)*. London: Pergamon Press, 1963.

Müller, L., (in collaboration with C. Fairhurst). "Principles in the Field of Geomechanics," in *Proceedings of the 14th Symposium of Austrian Regional Group International Society of Rock Mechanics (Salzburg, 1963)*. New York: Springer-Verlag, 1963.

Fairhurst, C. "Laboratory Measurement of Some Physical Properties of Rock," in *Proceedings of the 4th Symposium on Rock Mechanics (The Pennsylvania State University, November 1961)*, pp. 105-118. Bull. Mineral Industries Experiment Station, Pennsylvania State University, No. 76, 1961.

Fairhurst, C. "Wave Mechanics of Percussive Drilling (Parts 1-3)," *Mine & Quarry Engng.*, **27**(3,4,7), 122-130, 169-178, 327-328 (1961).

Fairhurst, C., and W. D. Lacabanne. "Hard Rock Drilling Techniques," *Mine & Quarry Engng.*, **23**, 157-161 (1957).

Fairhurst, C., and W. D. Lacabanne. "Some Principles and Developments in Hard Rock Drilling Techniques," in *Proceedings of the 6th Annual Drilling & Blasting Symposium (University of Minnesota, October 1956)*, pp. 15-25. Minneapolis: Univ. of Minnesota, School of Mines & Center for Continuing Study, 1956.

Fairhurst, C. "The Design of Rotary Drilling Bits," *Mine & Quarry Engng.*, **20**(6), 271-275 (1954).

Proctor, J. B., and C. Fairhurst. "Principles of Rock Drilling," *Sheffield Univ. Mining Mag.* (1954).