

---

## REFERENCES

- Adler, P.M. and Thovert, J.F.** (1999). Fractures and Fracture Networks. *Kluwer, Dordrecht.*
- Anderson, T.L.** (2005). Fracture Mechanics: Fundamentals and Applications. *Taylor & Francis.*
- Ayari, M.L. and Souma, V.E.** (1990). A fracture mechanics based seismic analysis of concrete gravity dams using discrete cracks. *Engg. Fract. Mech.* **35(1-3)**, 587-598.
- Bagherian, B., Sarmadivaleh, M., Ghalambor, A., Nabipour, A., Rasouli, V. and Mahmoudi, M.** (2010). Optimization of multiple-fractured horizontal tight gas well. *Int. Symp. and Exhib. on Formation Damage Control*, LA, USA.
- Bahrami, V. and Mortazavi, A.** (2008). A numerical investigation of hydraulic fracturing process in oil reservoirs using non-linear fracture mechanics. *Asian Rock Mech. Symp.*, Tehran.
- Basha, H.A. and El-Asmar, W.** (2003). The fracture flow equation and its perturbation solution. *Water Resour. Res.* **39(12)**, 1365.
- Bastian, P.** (1999). Numerical computation of multiphase flow in porous media. *Habilitationsschrift*.
- Bazant, Z.P.** (1983). Fracture in concrete and reinforced concrete. *IUTAM Prager Symp. on Mechanics of Geomaterials: Rocks, Concretes, Soils*. Z. P. Bazant, ed., Northwestern Univ., Evanston, III, 281-316.
- Bazant, Z.P.** (1984). Size effect in blunt fracture: concrete, rock, metal. *J. of Engg. Mech., ASCE*, **110(3)**, 518-535.
- Bazant, Z.P.** (1987). Fracture energy of heterogeneous material and similitude. *SEM-RILEM Int. Conf. on Fracture of Concrete and Rock*, S. P. Shah and S. E. Swartz, ed., Soc. for Exper. Mech., Bethel, Ct., 390-402.
- Bazant, Z.P.** (1993). Scaling laws in mechanics of failure. *J. of Engg. Mech., ASCE*, **119(9)**, 1828-1844.
- Bazant, Z.P. and Pfeiffer, P.A.** (1987). Determination of fracture energy from size effect and brittleness number. *ACI Mat. Jour.*, **84**, 463-480.

- Bazant, Z.P. and Xu, K.** (1991). Size effect in fatigue fracture of concrete. *ACI Mater. J.* **88(4)**: 390-399.
- Bazant, Z. P., and Kazemi, M. T.** (1990). Size effect in fracture of ceramics and its use to determine fracture energy and effective process zone length. *J. of Am. Ceramic Soc.*, **73(7)**, 1841-1853.
- Bazant, Z.P.** (1975). Pore pressure, uplift and failure analysis of dams. *Proc., Symp. on Criteria and Assumptions for Numer. Analysis of Dams*, Brit. Nat. Committee on Large Dams, Swansea, Wales, 781-808.
- Bazant, Z.P.** (1994). Recent advances in fracture mechanics, size effect and rate dependence of concrete: Implications for dams. *Proc. of Int. Work. on Dam Fracture and Damage*, Balkema, Rotterdam, 41-54.
- Bazant,Z.P. and Gettu, R.** (1990). Size effect in concrete and influence of loading rate. *Proceeding of First Materials Engg. Conf. on serviceability and durability of Construction Materials*, ASCE, New York, 1113-1123.
- Bazant,Z.P. and Gettu, R.** (1992). Rate effects and load relaxation in static fracture of concrete. *ACI Material Journal*, **89(5)**, 456-468.
- Bear, J.** (1979). Hydraulics of Ground water. *McGraw-Hills*, New York.
- Beavers, G.S. and Joseph, D.D** (1967). Boundary conditions at naturally permeable walls. *J. Fluid Mech.*, **30**, 197-207.
- Beavers, G.S., Sparrow, E. M., and Maguson, R. A.** (1970). Experiments on coupled parallel flows in a channel and bounding porous medium. *ASME J. Basic Engg.* **92**, 843-848.
- Berkowitz, B.** (1989). Boundary conditions along permeable fracture walls: influence on flow and conductivity. *Water Resour. Res.*, **25**, 1919-1922.
- Berman, A.S.** (1953). Laminar flow in channels with porous walls. *J. Appl. Phys.*, **24**, 1232-1235.
- Bhattacharjee, S.S. and Leger, P.** (1993). Seismic cracking and energy dissipation in concrete gravity dams. *Earthquake Engg. Struct. Dyn.* **22(11)**, 991-1007.
- Boussinesq J.** (1868). Thesis about the influence of friction within the steady flow of fluids. *J. Math. Pures. Appl.*, **13**, 377-42.
- Bout, D.F., Grasselli, G., Fredrich, J.T., Cook, B. K. and Williams, J. R.** (2006). Trapping Zones: The effect of fracture roughness on directional anisotropy of fluid flow and colloid transport in a single fracture. *Geophys. Res. Let.* **(33)**,L21402.

- Box, G.P.E. and Jenekis, G.M.** (1976). Time series analysis forecasting and control. *Holden Day*, San Francisco.
- Broek, D.** (1984). Elementary Engineering Fracture Mechanic. *Martinus Nijhoff Publ.*
- Brooks, R. and Corey, A. T.** (1964). Hydraulic properties of porous media. *Hydrology Paper, Vol. 3*, Colorado State University.
- Brown, S. R., Stockman, H. W., and Reeves, S. J.** (1995). Applicability of Reynolds equation for modeling fluid flow between rough surfaces. *Geophys. Res. Lett.*, **22**, 2537-2540.
- Brown, S.R.** (1987). Fluid flow through rock joints: the effect of surface roughness. *J. Geophys. Res.* **(92)**, 1337-1347.
- Brown, S.R.** (1995). Simple mathematical model of a rough fracture. *J. Geophys. Res.* **(100)**, 5941-5952.
- Brown, S.R. and Scholz, C.H.** (1985). Broad bandwidth study of the topography of natural science. *J. Geophys. Res.* **(90)**, 12575-12582.
- Brown, S.R., Kranz R. L. and Bonner B.P.** (1986). Correlation between the surfaces of natural rock joints. *J. Geophys. Res. Lett.* **13 (13)**, 1430-1433.
- Broz, Z., Souma, V.E., Bruhwiler, E. and Boggs, H.** (1991). Fracture mechanics experiments in a centrifuge. *Centrifuge-91*, H.Y. Ko and F.G. McLean, eds, A.A. Balkema, Rotterdam, The Netherlands, 575-581.
- Bruhwiler, E. and Souma, V.E.** (1991). Fracture mechanics analysis of concrete hydraulic structures. *Rep., ETL 1110-8-16 (FR)*, Dept. of Army, Army Corps of Engrs., Washington, D.C.
- Bruhwiler, E. and Whittmann, F.H.** (1990). Failure of dam concrete under seismic loading conditions. *Engg. Frac. Mech.*, **23(1/2/3)**, 565-571.
- Bruhwiler, E., Brog, J.J. and Souma, V.E.** (1991). Fracture model evaluation of dam concrete. *J. of Materials in Civil Engineering, ASCE*, **3(4)**, 235-251.
- Brush, D. J. and Thomson, N. R.** (2003). Fluid flow in synthetic rough walled fractures: Navier-Stokes, Stokes, and local cubic law simulations. *Water Resour. Res.* **39(4)**, 1085.
- Canadian Dam Safety Association (CDSA)** (1997). Dam safety guidelines and commentaries. *Edmonton, Alberta, Canada*.
- Carinteri, A., Spagnoli, A. and Vantadori, S.** (2009). Size effect in S-N curves: A fractal approach to finite life fatigue strength. *Int. J. Fatigue*, **31(5)**, 927-933.

- Carpinteri, A.** (1982). Notch sensitivity in fracture testing of aggregate materials. *Engg. Frac. Mech.*, **16(4)**, 467–481.
- Carpinteri, A.** (1984). Scale effects in fracture of plain and reinforced concrete structures. *Fracture mechanics of concrete: structural application and numerical calculation*, G. C. Sih and A. Di Tommaso, eds., Martinus Nijhoff Publ., The Hague, The Netherlands, 95-140.
- Carpinteri, A. and Paggi, M.** (2007). Self-similarity and crack growth instability in the correlation between the Paris constants. *Engg. Frac. Mech.* **74**:1041–1053.
- Carpinteri, A. and Paggi, M.** (2009). A unified interpretation of the power laws in fatigue and the analytical correlations between cyclic properties of engineering materials. *Int. J. Fatigue* **31**: 1524–1531.
- Carpinteri, A. and Spagnoli, A.** (2004). A fractal analysis of size effect on fatigue crack growth. *Int. J. Fatigue* **26**: 125–133.
- Carpinteri, A., Valente, S., Zhou, F.P., Ferrara, G. and Melchiorri, G.** (1997). Tensile and flexural creep rupture tests on potentially damaged concrete specimens. *Mat. Strucs.*, **30**, 269-276.
- CEB-FIP Model Code** (1990). *Bulletin Information* No. 190a, 190b.
- Cedolin, L., Deipoli, S. and Iori, I.** (1987). Tensile behavior of concrete. *J. Engg. Mech., ASCE*, **113(3)**, 431-449.
- Chaimoon, K., Attard, M.M. and Tin-Loi, F.** (2008). Crack propagation due to time-dependent creep in quasi-brittle materials under sustained loading. *Comp. Meth. Appl. Mech. Engg.*, Elsevier, 197, 1938-1952.
- Chang, M.H., Chen, F. and Straughan, B.** (2006). Instability of Poiseuille flow in a fluid overlying a porous layer. *J. Fluid Mech.*, **(564)**, 287-303.
- Chavez, A.K. and Fenves, G.L.** (1995). Earthquake response of concrete gravity dams including base sliding. *J. Engg. Mech.* **121(5)**, 865-875.
- Chief Engineer (Sone)** (2011a). Agenda note for ninth meeting of joint team of engineers, irrigation works circle, *Obra, Irrigation department, Uttar Pradesh, India*.
- Chief Engineer (Sone)** (2011b). Agenda note for ninth meeting of Rihand dam structural behavior monitoring committee, irrigation works circle, *Obra, Irrigation department, Uttar Pradesh, India*.
- Chopra, A.K. and Zhang, L.** (1991). Earthquake-induced base sliding of concrete gravity dams. *J. Struct. Engg.*, **117(12)**, 3698-3719.

- Christian, K., Richard A., Schultz. A., Rishi P. and Donald M. R.** (2010). Cubic law with aperture-length correlation: implications for network scale fluid flow. *Hydrogeology Journal, Springer-Verlag*.
- Christianovich, S. A. and Zheltov, Y. P.** (1955). Formation of vertical fractures by means of highly viscous fluid. *Proc. 4<sup>th</sup> Petrol. Congress*, 579-586.
- Ciavarella, M., Paggi, M. and Carpinteri, A.** (2008). One, no one and one hundred thousand crack propagation laws: A generalized Barenblatt and Botvina dimensional analysis approach to fatigue crack growth. *J. Mechanics and Physics of Solids*, **56**, 3416-3432.
- Cleary, M. P.** (1980). Comprehensive design formulae for hydraulic fracturing. *Annual Tech. Conference and Exhib.*, Dallas, TX, USA.
- Crandall, D., Ahmadi, G. and Smith, G.S.** (2010). Computational modeling of fluid flow through a fracture in permeable rock. *Transp. Porous Media*, **(84)**, 493-510.
- Dagan,G.**(1993). Higher order correction for effective permeability of heterogeneous isotropic formations of lognormal conductivity distribution. *Transp. Porous Media*, **(12)**, 279-290.
- DeBorst, R.A.H., Boogaard, V.D., Sluys, L.J. and Van Der Bogert, P.A.J.** (1993). Computational issue in time-dependent deformation and fracture in concrete. *Proc. 5<sup>th</sup> Int. RILEM Symp. Creep and Shrinkage of Concrete*, 309-325.
- Donolon, W.P. and Hall, J.F.** (1991). Shake table study of concrete gravity dam monoliths. *Earthquake Engg. Struct. Dyn.* **20**, 769-786.
- Du, J., Yon, J.H., Hawkins, N.M. and Kobayashi, A.S.** (1990). Analysis of the Fracture Process Zone of a Propagating Concrete Crack Using Moire Interferometry, in Micromechanics of Failure of Quasi-Brittle Materials, S.P, Shah, S.E. Swartz and M.L. Wang (eds.), *Elsevier*, London, 146-155.
- Durham W. P., and Bonner, B.P.** (1994). Self propping and fluid flow in slightly offset joints at high effective pressures. *J. Geophys. Res.* **(99)**, 9391-9399.
- El-Aidi, B. and Hall, J.** (1989). Non-linear earthquake response of concrete gravity dams. Part I: Modeling. *Earthquake Engg. Struct. Dyn.* **18(6)**, 837-851.
- Electric Power Research Institute(EPRI)** (1995). The effect of hydrostatic pressure on fracture of concrete. *University of Colorado*, Boulder, Colorado.
- Elrod, H.G.** (1979). A general theory of laminar lubrication with Reynolds roughness. *J. Lubr. Tech.* **(101)**, 8-14.

- Federal Energy Regulatory Commission (FERC)** (2002). Engineering guidelines for the evaluation of hydropower projects. *Washington, D.C.*
- Fetter, C. W.** (1999). Contaminant Hydrogeology. *Prentice-Hall, Upper Saddle River, NJ, USA.*
- Figueiras, J.A. and Owen, D.R.J.** (1984). Non-linear analysis of reinforced concrete shell structures. *Int. Conf. on Computer Aided Analysis and Design of Concrete Structures, Part I, split, Yugoslavia*, 509-532.
- Fischer, U.B., Kulli, B., and Fluhler, H.** (1998). Constitutive relationships and pore structure of undisturbed fracture zone samples with cohesionless fault gouge layers. *Water Resour. Res.*, **34(7)**, 1695-1701.
- Footer, M.L., Mai, Y.W. and Cotterell, B.** (1986). Crack growth resistance curves in strain-softening materials. *J. Mech. And Physics of Solids*, **34(6)**, 593-607.
- Fourar, M., and Bories, S.** (1995). Experimental study of air-water two phase flow through a fracture (narrow channel). *Int. J. Multiphase Flow*, **(21)**, 621-637.
- Fourar, M., Lenormand, R., and Persoff, P.** (1993). Two-phase flow in smooth and rough fractures: Measurement and correlation by porous medium and pipe flow models. *Water Resour. Res.*, **(29)**, 3699-3708.
- Gangi, A.F.** (1978). Variation of whole and fractured porous rock permeability with confining pressure. *Int. J. Rock Min. Sci. Geomech. Abstr.* **(15)**, 249-257.
- Ge, S.** (1997). A governing equation for fluid flow in rough fractures. *Water resources Research*, **(33)**, 53-61.
- Gioia, G., Bazant, Z.P. and Pohl, B.** (1992). Is no-tension dam design always safe? *Dam Engg.*, **3(1)**, 23-34.
- Giovanni, D.L.** (2009). Numerical modeling for time-dependent fracturing in concrete. *J. Engg. Mech., ASCE*, **135(7)**, 632-640.
- Gopalaratnam, V.S. and Shah, P.S,** (1985). Softening response of plain concrete in direct tension. *ACI J.*, **82(3)**, 310-323.
- Griffith, A.A.** (1921). The phenomena of rupture and flow in solids. *Phil. Trans. Royal Society, Series A*, **221**, 163-198.
- Griffith, A.A.** (1924). The theory of rupture. *Proc. 1<sup>st</sup> Intern. Congr. Appl. Mech.*, Delft, 55-63.

- Hakami, E. and Larsson E.** (1996). Aperture measurements and flow experiments on single natural fracture. *Int. J. Rock Mech. Min. Sci. Geomech. Abs.*, **(33)**, 395-404.
- Hall, J.F.** (1998). Efficient non-linear seismic analysis of arch dams. *Earthquake Engng. Struct. Dyn.* **27(12)**, 1425-1444.
- Hansen, K.D. and Roehm, L.H.** (1979). The response of concrete dams to earthquakes. *Water Power Dam Constr.* **4(II)**, 275-305.
- Harsh, S., Shen, Z. and Darwin, D.** (1990). Strain rate sensitive behavior of cement paste and mortar in compression. *ACI Material J.* **Vol. 87(5)**, 508-516.
- Hasgawa, E. and Izuchi, H.** (1983). On the steady flow through a channel consisting of an uneven wall and plane wall. *Bull. Jap. Soc. Mech. Eng.* **(26)**, 514-520.
- He, S., Plesha, M.E., Rowlands, R.E. and Bazant, Z.P.** (1992). Fracture energy tests of dam concrete with rate and size effects. *Dam Engg.*, **3(2)**, 139-159.
- Helming, R.** (1997). Multiphase flow and transport processes in the subsurface: a contribution to the modeling of hydro systems. *Springer-Verlag*, Berlin, Heidelberg, New York.
- Hillerborg, A.** (1978). A model for fracture analysis. *Tech. Rep., TVBM-3005, Div. of Build. Mat.*, The Lund Inst. Of Tech., Lund, Sweden.
- Hillerborg, A., Modeer, M. and Petersson, P.E.** (1976). Analysis of crack formation and crack growth in concrete by means of fracture mechanics and finite elements. *Cement and Concrete Research*, **6(6)**, 773-782.
- Illangasekare, T., Amadei, B., and Chinnaswamy, C.** (1992). CRFLOOD: A numerical model to estimate uplift pressure distribution in cracks in concrete gravity dams. *Tech. Rep. TR-101671, Vol.4*, EPRI, Prepared by university of Colorado, Boulder, Colo.
- Indraratna, B., Ranjith, P.G, Price, J.R. and Gale, W.** (2003). Two-phase (air and water) flow through rock joints: analytical and experimental study. *J. Geotech. Geomech. Eng., ASCE*, **129(10)**, 918-928.
- International Commission on Large Dams (ICOLD)** (1986). *Earthquake analysis for dams. Bulletin 52*, Paris.
- International Commission on Large Dams (ICOLD)** (2001). Design features of dams to resist seismic ground motion. *Bulletin 120*, Paris.
- Irwin, G.R.** (1956). Onset of fast crack propagation in high strength steel and aluminum alloys. *Sagamore Research Conference Proceedings*, **Vol. 2**, 289-305.

- Irwin, G.R.** (1957). Analysis of stresses and strains near the end of a crack traversing a plate. *J. Appl. Mech.*, **24**, 361-364.
- Ishii, M.** (1975). Thermo-fluid dynamic theory of two-phase flow, *Electricite de France*, Paris.
- Iwai, K.** (1976). Fundamental studies of fluid flow through a single fracture. *Ph. D. Thesis*, Univ. of Calif., Berkeley.
- Javanmardi, F., Leger, P., and Tinawi, R.** (2005a). Seismic water pressure in cracked concrete gravity dams: experimental study and theoretical modeling. *J. Struc. Engg., ASCE*, **131(1)**, 139-150.
- Javanmardi, F., Leger, P., and Tinawi, R.** (2005b). Seismic structural stability of concrete gravity dams considering transient uplift pressures in cracks. *Engg. Struc. Elsevier*, **27**, 616-628.
- Jeffery, R. G., Settari, A. Mills, K. W., Zhang, X. and Detourmay, E.** (2001). Hydraulic fracturing to induce caving: fracture model development and comparison to field data. *Proc., 38<sup>th</sup> US Rock Mechanics Symp. Vol. 1*, Balkema, Lisse, the Netherland, 251-259.
- Jing, L., Ma, Y. and Fraz, Z.** (2001). Modeling of fluid flow and solid deformation for fractured rocks with discontinuous deformation analysis (DDA) method. *Int. J. Rock Mech. Min. Sci.* **38**, 343-355.
- Kanenawa, K., Sasaki, T. and Yamaguchi, Y.** (2004). Effects of fracture material properties on crack propagation of concrete gravity dams during large earthquakes. *13<sup>th</sup>World Conference on Earthquake Engineering*, Vancouver, B.C., Canada, August 1-6, 2004, Paper No. 135.
- Keller, A. A., Blunt, M. J., and Roberts, P. V.** (2000). Behavior of non-aqueous phase liquids in fractured porous media under two-phase flow conditions. *Transp. Porous Media*, **38**, 189-203.
- Kim, I., Lindquist, B. and Durham, W.** (2003). Fracture flow simulation using a finite-difference lattice Boltzmann method. *Phys. Rev. E.*, **(67)**, 046708.
- Krantz, R.E., Franke,l A.D., Engelder, T., and Scholz, C.H.** (1979). The permeability of whole and jointed Barre granite. *Int. J. Rock Min. Sci. GeomechAbstr.* **(16)**, 225-234.
- Leger, P. and Leclerc, M.** (1996). Evaluation of earthquake ground motion to predict cracking response of gravity dams. *Engg. Struct.* **18(18)**, 227-239.
- Liaw, B.M.,Jeang, F.L., Du, J.J., Hawkins, N.M. and Kobayashi, A.S.** (1990). Improved non-linear model for concrete fracture. *J. Engg. Mech. ASCE*, **116(2)**, 429-445.

- Lin, G., Zhou, J. and Fan, C.** (1993). Dynamic model rupture test and safety evaluation of concrete gravity dams. *Dam Engg.* **4(3)**, 769-786.
- Liu, E.** (2005). Effect of fracture aperture and roughness on hydraulic and mechanical properties of rocks: implication of seismic characterization of fractured reservoirs. *J. Geophys. Engg.* **(2)**, 38-47.
- Liu, R., Liu,Q.S. and Zhao, S.C.** (2006). Instability of Poiseuille flow in a fluid- porous system. *Phys. Fluids*, **(20)**, 104105.
- Liu, Z.G., Swarz, S.E., Hu, K.K. and Kyan, Y.C.** (1989). Time dependent response and fracture of plain concrete beams. *Int. Conf. on Fracture of Concrete and Rocks: Recent Development, Elsevier Applied Science*, London, 577-586.
- Logan, J. M., Rudnicki, J. W., Wawersik, W. R., and Wong, T.** (2000). Geomechanics perspective in terrestrial sequestration of CO<sub>2</sub> : an assessment of research needs. *Adv. Geophys.*, **43**, 97-117
- Lomize, G.M.** (1951). Water flow in jointed rock. *Gosenergoizant*, Moscow.
- Louis, C.** (1969). A study of groundwater flow in jointed rock and its influence on stability of rock masses. *Rock Mechanics Research Report No. 10*, Imperial College London, England.
- Mandelbrot, B. B.** (1982). Self-affine fractals and fractal dimension. *Phys. Scr.*, **(32)**, 257-260.
- Mindess, S. and Sha, S.P.** (1986). Cement based composites: Strain rate effects on fracture. *Materials Research Society Symposium Proceedings*, **(64)**, 270.
- Mindess. S.** (1985). Rate of loading effects on the fracture of cementitious materials. *Application of Fracture Mechanics to Cementitious Composites*, ed. S.P. Shah. Martinus Nijhoff Publ. Dordrecht, 617-638.
- Mohais, R., Xu, C. and Dowd, P.A.** (2011). Fluid flow and heat transfer within a single horizontal channel in an Enhanced Geothermal System. *J. Heat Transfer*, **(133)**, 1126031.
- Mohais, R., Xu, C., Dowd, P.A., Hand, and Phillip, M.** (2012). Permeability correction factor for fracture with permeable walls. *Geophysical Research*, **39(3)**, L03403.
- Mourzenko, V. V., Thovert, J. F., and Adler, P. M.** (1995). Permeability of a single fracture-validity of Reynolds equation. *J. Phys. II* **(5)**, 465-482.
- Murdoch, L. C., and Slack, W. W.** (2002). Forms of hydraulic fractures in shallow fine grained formations. *J. Geotech. Geoenviron. Engg.* **128(6)**, 479-487.

- Muskhelishvili, N.I.** (1953). Some Basic Problems in the Theory of Elasticity. Noordhof.
- National Research Council (NRC)**(1990). Earthquake engineering for concrete dams: Design, performance and research needs. *National Academy Press*, Washington, DC.
- Neale, G. and Nader, W.** (1974). Practical significance of Brinkman's extension of Darcy's law. *Can. J. Chem. Eng.* **(52)**, 475-478.
- Nichol, M. J., and Glass, R. J.** (2001). Simulation of immiscible viscous displacement within the plane of a horizontal fracture. *Rock mechanics in the national interest*, Elsworth, Tinucci, and Heasley, eds., Swets and Zeitlinger Lisse, 205-210
- Nicholl, C.E., Rajaram, H., Glass R.J. and Detwiler, R.** (1999). Saturated flow in single fracture: evaluation of Reynolds equation in measured aperture fields. *Wat. Res. Res.*, **(35)**, 3361-3373.
- Novakowski, K.S., Evans, G.V., Lever, D.A. and Raven, K.G.** (1985). A field example of measuring hydrodynamic dispersion in a single fracture. *Water Resour. Res.* **(21)**, 1165-1174.
- Novakowski, K.S., Lapcevic, P.A., Voralec, J. and Bickerton, G.** (1995). Preliminary interpretation of tracer experiments conducted in a discrete rock fracture under conditions of natural flow. *Geophys. Res. Lett.*, **(22)**, 1417-1420.
- Ohmachi, T., Zhang, H., Yabuki, N. and Tsukada, N.** (1998). Experimental study of hydrodynamic pressure inside narrow cavities. *Dam Eng. JSDE*. **8**, 35-40.
- Olson, J.E.** (2003). Sub linear scaling of fracture aperture versus length: an exception or the rule? *J. Geophys. Res.* **108(B9)**, 2413.
- Oron, P. F. and Brian B.** (1998). Flow in rock fractures: the local cubic law reexamined. *Water Resources Research*, **(34)**, 2811-2825.
- Pagg, M.** (2009). A dimensional analysis approach to fatigue in quasi-brittle materials. *Frat. Integr. Struc.*, **10**, 43-55.
- Patir, N. and Cheng, H.S.** (1978). An average flow model for determining the effects of three dimensional roughnesses on partial hydrodynamic lubrication. *J. Lubr. Tech.*, **(100)**, 12-17.
- Peakau, O. A., and Cui, X.** (2004). Failures analysis of fractured dams during earthquakes by DEM. *Eng. Struct.* **26(10)**, 1483-1502.
- Peakau, O. A., and Zhu, X.** (2006). Seismic behavior of cracked concrete gravity dams. *Earthquake Eng. Struct. Dyn.* **35(4)**, 477-495.

- Peakau, O. A., and Zhu, X.** (2008). Effect of seismic uplift pressure on the behavior of concrete gravity dams with penetrated crack. *J. Engg. Mech., ASCE*, **134(11)**, 991-999.
- Phillips, O. M.** (1991). Flow and reaction in permeable Rocks. *Cambridge University Press*, Cambridge.
- Plizzari, G.A.** (1997). LEFM applications to concrete gravity dams. *J. Str. Engg., ASCE*, **123(8)**, 808-815.
- Plizzari, G.A. and Souma, V.E.** (1995). Centrifuge modeling and analysis of concrete gravity dams. *J. Str. Engg., ASCE*, **121(10)**, 1471-1479.
- Poon, C. Y., Sayles, R.S. and Jones, T. A.** (1992). Surface measurements and surface characterization of naturally fractured rocks. *J. Phys. D*, **25**, 1269-1275.
- Power, W. L. and Tullis, T.E.** (1991). Euclidean and fractal models for the description of rock surface roughness. *J. Geophys. Res.* **(96)**, 415-424.
- Pruess, K., and Tsang, Y. W.** (1990). On two-phase relative permeability and capillary pressure of rough-walled rock fractures. *Water Resour. Res.* **26**, 1915-1926.
- Pyrak-Nolte, L. J., Cook, N. G.W. Nolte, D.D. and Witherspoon, P.A.** (1987). Hydraulic and mechanical properties of natural fractures in low permeable rocks. *Proc. 6<sup>th</sup> Int. Congress Rock. Mech.*, 225-231.
- Quin, J., Chen, Z. Zhan, H., and Guan, H.** (2010). Experimental study of the effect of roughness and Reynold number on fluid flow in rough-walled single fracture: A check of local cubic law. *Hydrol. Process.*, **(24)**.
- Quin, J., Zhan H., Chen, Z., and Ye, H.** (2011). Experimental study of solute transport under non-Darcian flow in single fracture. *J. Hydrol.*, **399**, 246-254.
- Quin, J., Zhan, H., Zhao, W. and Suan, F.** (2005). Experimental study of turbulent unconfined groundwater flow in a single fracture. *J. Hydrol.* **(311)**, 134-142.
- Quin, J., Zhan, H.,and Zhao, W. F.** (2007). Experimental evidence of scale-dependent hydraulic conductivity for fully developed turbulent flow in a single fracture. *J. Hydrol.*, **311(3-4)**, 206-215.
- Rasmuson, A. and Neretnieks, I.** (1986). Radionuclide transport in fast channels in crystalline rock. *Water Resour. Res.*, **(22)**, 1247-1256.
- Rasmussen, T. C.** (1991). Steady fluid flow and travel times in partially saturated fractures using discrete air-water interfaces. *Water Resour. Res.*, **27**, 67-76.

- Raven, K. G. and Gale, J.E.** (1985). Water flow in natural rock fracture as a function of stress and sample size. *Int. J. Rock Mech. Min. Sci. Geomech. Abstr.*, **22(4)**, 251-261.
- Raven, K.G., Novakowski, K.S. and Lapcevic, P.A.** (1988). Interpretation of field tracer tests of a single fracture using a transient solute storage model. *Water Resour. Res.*, **(24)**, 2019-2032.
- Ray, S. and Chandra Kishen J. M.** (2010). Fatigue crack propagation model for plain concrete - An analogy with population growth. *Eng. Fracture Mech.* **77**: 3418-3433
- Ray, S. and Chandra Kishen,C. J. M.** (2011). Fatigue crack propagation model and size effect in concrete using dimensional analysis. *Mech. Mater.* **43(129)**: 75–86.
- Reich, R.W., Cervenka, J. and Souma, V.E.** (1994). MERLIN a three dimensional programme based on a mixed iterative solution strategy for problems in elasticity, plasticity and linear and nonlinear fracture mechanics. *Rep. Electric Power Res. Inst.*, Palo Alto, California.
- Reichenberger, V., Jakobs, H., Bastian, P. and Helmig, R.** (2005). A mixed dimensional finite volume method for two-phase flow in fractured porous media. *Elsevier Science*.
- Reinhardt, H.W.** (1985). Crack softening zone in plain concrete under static loading. *Cement Concrete Research*, **15**, 42-52.
- Reinhardt, H.W.** (1986). Strain rate effects on the tensile strength of concrete as predicted by thermodynamic and fracture mechanics models. *Cement-Based Composites: Strain Rate Effects on Fracture*. eds. S. Mindess and S.P. Shah. 1-14.
- Reinhardt. H.W.** (1985). Tensile fracture of concrete at high rates of loading. *Application of Fracture Mechanics to Cementitious Composites*. ed. S.P. Shah. Martinus Nijhoff Publ. Dordrecht. pp. 559-592.
- Renshaw, C.E.** (1995). On relationship between mechanical and hydraulic apertures in rough walled fractures. *J. Geophys. Res.* **(100)**, 24629-24636.
- Roelfstra, R.E. and Wittman, F.H.** (1986). A numerical method to link strain softening with fracture in concrete, fracture toughness and fracture energy in concrete. F.H. Wittman (ed.), *Elsevier Science*, Amsterdam, 163-175.
- Ross, C.A. and Kuennen, S.T.** (1989). Fracture of concrete at high strain-rates. *Fracture of Concrete and Rock: Recent Developments*. eds. S.P. Shah. S.E. Swartz and B. Barr. *Elsevier Applied Science*. London. UK. pp. 152-161

- Rossi, P. and Boulay, C.** (1990). Influence of free water in concrete on cracking process. *Magazine of Concrete research*, **V.42 (152)**, 143-146.
- Ruzicka, M. C.** (2008). On dimensionless numbers. *Chem. Eng. Res. and Design* **86**: 835-868.
- Sahraoui, M. and Kaviani, M.** (1992). Slip and no-slip velocity boundary conditions at interface of porous, plain media. *Int. J. Heat Mass Transfer*, **(35)**, 927-943.
- Saouma, V., Broj, J., Bruhwiler, E., and Boggs, H.** (1991). Effect of aggregate and specimen size on fracture properties of dam concrete. *J. Mat. In Civil Engg., ASCE* **3(3)**, 204-218.
- Sarris, E. and Papanastasiou, P.** (2012). Modeling of hydraulic fracturing in a poroelastic cohesive formation. *Int. j. Geomech., ASCE*, **12(2)**.
- Sausse, J. and Genter, A.** (2005). Types of permeable fractures in granite, in Petrophysical Properties of Crystalline Rocks, edited by P. K. Harvey, *Geol. Soc. Spec. Publ.*
- Schmittbuhl, J. F., Schmitt, F. and Scholz, C. H.** (1995). Scaling invariance of crack surfaces. *J. Geophys. Res.*, **100**, 5953-5973.
- Schultz, R.A., Soliva, R., Fossen, H., Okubo, C.H., Reeves, D.M.** (2008). Dependence of displacement-length scaling relations for fractures and deformation bands on the volumetric changes across them. *J. Struct. Geol.* **(30)**, 1405-1411.
- Shah, S.P. and Chandra, S.** (1970). Fracture of concrete subjected to cyclic and sustained loading. *ACI Journal Proceedings*, **(67)**, 10, 816-825.
- Sharp, J.C., and Maini, Y.N.T.** (1972). Fundamental considerations on hydraulic characteristics of joints in rock. *Proc. Symp. on Percolation through Fissured Rock, International Society for Rock Mechanics*, Stuttgart, n. T1-F.
- Shi, Z.** (2009). Crack Analysis in Structural Concrete: Theory and Applications. *Elsevier*, U.K.
- Sisavath, S. A., Al-Yarubi, A., Pain, C. C. and Zimmermann, R.W.** (2003). A simple model for deviations from the cubic law for fracture undergoing dilation or closure. *Pure Appl. Geophys.* **(106)**, 1009-1022.
- Skjetne, I.N., Hansen, A. and Gudmundsson, J.S.** (1999). High velocity flow in rough fracture. *J. Fluid Mech.* **(383)**, 1-28.
- Slowik, V., and Saouma, V. E.** (1994). Investigation on cracking of concrete wiyh application to the seismic safety of dams. *Proceeding of Euro-C*, 679-688.

- Slowik, V., and Saouma, V. E.** (2000). Water pressure in propagating concrete cracks. *J. Struc. Engg., ASCE*, **126**(2), 235-142.
- Slowik, V., Angelo, G.P. and Souma, V.E.** (1996). Fracture of concrete under variable amplitude fatigue loading. *ACI Material Journal*, **93**(3), 272-283.
- Soliman, M. Y., East, L. and Adams, D.** (2004). Geo-mechanics aspects of multiple fracturing of horizontal and vertical wells. Int. Therm. Operations and Heavy Oil Symp. and Western Regional Meeting, CA, USA.
- Spagnoli, A.** (2004). Self-similarity and fractals in the Paris range of fatigue crack growth. *Mech. Mater.* **37**, 519-529.
- Sung-Hoon, J., Yeo, I. W., and Lee, K.** (2003). Influence of ambient ground water flow on DNAPL migration in a fractured network. *Geoph. Res. Lett.*, **30**(10).
- Tada, H., Paris, P.C., Irwin, G.R.** (2000). The Stress Analysis of Cracks Handbook. ASME Press, N.Y.
- Terzhagi, K.** (1936). Simple tests to determine hydrostatic uplift, *Engg. News Rec.*, June 18,872.
- Thompson, M. and Brown, S.** (1991). The effect of anisotropic surface roughness on flow and transport in fractures. *J. Geophys. Res.*, **(96)**, 21923-21932.
- Tilton, N. and Cortelezze** (2006). The destabilizing effects of wall permeability in channel flow: a linear stability analysis. *Phys. Fluids*, **(18)**, 051702.
- Tinawi, R. and Guizani, L.** (1994). Formulation of hydrodynamic pressures in cracks due to earthquakes in concrete dams. *Earthquake Engg. Struct. Dyn.* **23**, 699-715.
- Tsang, Y. W., and Tsang, C. F.** (1987). Channel model of flow through fractured media. *Water Resour. Res.*, **23**(3), 467-479.
- Tsang, Y.W., and Witherspoon, P. A.** (1983). The dependence of fracture mechanical and fluid flow properties on fracture roughness and sample size. *J. Geophys. Res.*, **(88)**, 2359-2366.
- Tsang, Y.W., and Witherspoon, P.A.** (1981). Hydromechanical behavior of a deformable rock fracture subject to normal stress. *J Geophys. Res.* **(86)**, 9287-9298.
- US Army Corps of Engineers (USACE)** (1995). Engineering and design, gravity dams. *EM 1110-2-2200*, Washington, DC, USA.

- US Bureau of Reclamation (USBR)** (1987). Design of small dams. Colorado (USA): Denver.
- VanZil, G.P.A.G., DeBorst, R. and Rots, J.G.** (2001). The role of crack rate dependence in long term behavior of cementitious materials. *Int. J. Solids Struct.*, **38(30-31)**, 5063-5079.
- Vermilye, J.M. and Scholz, C.H.** (1995). Relation between vein length and aperture. *J. Struct. Geol.* **(17)**, 423-434.
- Waite, M., Ge, S. and Spetzler, H.** (1999). A new conceptual model for flow in discrete fractures: experimental and numerical studies. *J. Geophys. Res.*, **(104)**, 13049-13059.
- Wallis, G. B.** (1969). One-dimensional two-phase flow, McGraw-Hill, New York.
- Wen, Z., Huang, G., and Zhan, Z.** (2006). Non-Darcian flow in a single confined vertical fracture toward a well. *J. Hydrol.*, **330 (3-4)**, 698-708.
- Westergaard, H.M.** (1939). Bearing pressures and cracks. *J. Appl. Mech.*, **61**, 49-53.
- White, F.M.** (1994). *Fluid Mechanics*, McGraw Hills Publ.
- Williams, M.L.** (1952). Stress singularities resulting from various boundary conditions in angular corners of plates in extension. *J. Appl. Mech.*, **19**, 526-528.
- Williams, M.L.** (1957). On the stress distribution at the base of a stationary crack. *J. Appl. Mech.*, **24**, 109-114.
- Witherspoon, P.A., Wang, J.S.Y., Iwai, K., and Gale, J.E.** (1980). Validity of cubic law for fluid flow in a deformable rock fracture. *Water Resour. Res.* **(16)**, 1016-1024.
- Wittke, W.** (1990). *Rock mechanics theory and applications with case studies*. Berlin (Germany), Springer -Verlag.
- Wittmann, F.H. and Zitsev, J.** (1971). Behavior of hardened cement paste and concrete under high sustained load. *Mech. Behavior of Mat., Proceeding of international conference*, **Vol. 4**, Society of Material Science, Japan, 84-95.
- Wittmann, F.H.** (1985). Influence of time on crack formation and failure of concrete. *Application of fracture mechanics to cementitious composites*. ed. S.P. Shah. Martinus Nijhoff Pub. Dordrecht. pp. 593-616.
- Wu, I.S. and Bazant, Z.P.** (1993). Finite element modeling of rate effect in concrete fracture with influence of creep. *Proc. 5<sup>th</sup> International RILEM Symposium (Con Creep 5)* held at Barcelona.

- Yang, T.Y.** (1990). *Finite Element Methods*. Prentice Hall.
- Yeo, W. and Ge, S.** (2005). Applicable range of Reynolds equation for fluid flow in a rock fracture. *Geosc. J.* **(9)**, 347-352.
- Yeo, I., de Freitas, M.H. and Zimmerman, R.W.** (1998). Effect of shear displacement on the aperture and permeability of rock fracture. *Int. J. Rock Mech. and Min. Scien.*, **(28)**, 325-331.
- Yi, K.S., dill, S.J. and Dauskardt R.H.** (1997). Sub critical crack growth in glasses under cyclic loads: Effect of hydrodynamic pressure in aqueous environments. *Acta Materialia*. **45(7)**, 2671-2684.
- Zhan, H.** (1998). Transport of waste leakages in stratified formation. *Adv. Water Resour.*, **22(2)**, 159-168.
- Zhang, H. and Ohmachi, T.** (1998). Two dimensional analysis of seismic cracking in concrete gravity dams. *Dam Eng.* **8**, 93-101.
- Zimmerman, R. W., and Bodvarsson, G.S.** (1996). Hydraulic conductivity of rock fractures. *Transp. Porous Media*, **23**, 1-30.
- Zimmerman, R. W., and Main I.G.** (2004). *Hydromechanical behavior of fractured rocks-Mechanics of Fluid-Saturated Rocks*. Ed. Y Gueguen and M. Boutea, Elsevier, London.
- Zimmerman, R. W., Chen, G.S. and Cook, N. G. W.** (1992). The effect of contact area on permeability of fractures. *J. Hydrol.* **(139)**, 79-96.
- Zimmerman, R. W., Kumar, S. and Bodvarsson, G.S.** (1991). Lubrication theory analysis of the permeability of rough-walled fractures. *Int. J. Rock Mech.,* **(28)**, 325-331.
- Zimmerman, R.W. and Yeo, I.W.** (2000). Fluid flow in rock fractures: from the Navier-Stokes equations to the cubic law. In B. Fabishenko, P.A. Witherspoon and S.M. Benson, ed. *Dynamics of Fluids in Fractured Rocks*, American Geoph. Union, Washington.