

Referencias

- AB (2002). Anuari estadistic de la ciutat de Barcelona. *Ayuntamiento de Barcelona*.
- Abrams, D. (1987). Influence of axial force variation on flexural behaviour of reinforced concrete columns. *ACI Structural Journal*, 84(3), 246–254.
- Abrams, D. P. (1992). Strength and behaviour of unreinforced masonry elements. *Proceedings of the 10th World Conference on Earthquake Engineering, Madrid, Spain*, 6, 3475–3480.
- Abrams, D. P. (1996). Seismic response patterns for urm buildings. *Proceedings of the Seventh North America Masonry Conference, June 2-5*, (pp. 950–961).
- ACI- ASCE Committee 352 (1976). Recommendations for design of beam-column joints in monolithic reinforced concrete structures. *Journal ACI*, 73(7), 365–436.
- ACI Committee 318 (1989). Building code requirements for reinforced concrete (ACI 318-89) and commentary. *American Concrete Institute, Detroit*.
- Adriono, T., y Park, R. (1987). Seismic design considerations of the properties of New Zealand manufactured steel reinforced bars. . *Proceedings of the Pacific Conference on Earthquake Engineering, Wairakei, New Zealand.*, 1, 13–24.
- Aguilar, M.A. (2000). Banco de fotografías aéreas del municipio de Manizales.
- Aguirre, M. y Gutierrez, J.C. (1992). Modelo tridimensional de las formaciones superficiales de Manizales. Tesis de grado. Universidad de Caldas.
- Ahmad, H., y Shah, S. (1985). Structural properties of high strength concrete and its implications for precast prestressed concrete. *Journal Prestressed Concrete Institute*, 30(6), 92–119.
- AIS (1998). Normas colombianas de diseño y construcción Sismo Resistente, NSR-98. *Asociación colombiana de Ingeniería Sísmica*. Ley 400 de 1997. Decreto 33 de 1998.

- Ambraseys, N. N., Simpson, K. A., y Bommer, J. J. (1996). Prediction of horizontal response spectra in Europe. *Earthquake Engineering and Structural Dynamics*, 25, 371–400.
- Ambrose, J. (1991). *Simplified design of masonry structures*. John Wiley & Sons, INC.
- Ameny, P., Loov, R. E., y Shrive, N. G. (1983). Prediction of elastic behaviour of masonry. *International Journal of Masonry Construction*, 3(1), 1–9.
- Aming, M. y Aming, A. H. S. (1966). A nonstationary stochastic model for strong motion earthquakes. *Structural Research Series*, 306.
- Amrhein, J. E. (1992). *Reinforced masonry engineering handbook*. Fifth edition, Masonry Institute of America, Los Angeles.
- Anagnos, T., Rojahn, C., y Kiremidjian, A. S. (1995). *NCEER-ATC joint study on fragility of buildings*. Technical report, NCEER-95-0003. National Center for Earthquake Engineering Research. State University of New York at Buffalo.
- Ang, A. H-S., Kim, W. J., Kim, S. B. (1993). *Damage estimation of existing bridge structures*. Technical report, Structural Engineering in Natural Hazards Mitigation: Proceedings, ASCE Structures Congress 1993, Irvine CA.
- Ang, B. G., Priestley, M. J. N., y Paulay, T. (1989). Seismic shear strength of circular reinforced concrete columns. *ACI Structural Journal*, 86, 45–58.
- Arcos, H., y Porcu, M. C. (2003). Movimientos sísmicos y estructuras murarias. Origen, efectos y evaluación de daños en la vivienda tradicional (terremoto en la comarca del río Mula del 2 de febrero de 1999). *Consortio de Compensación de Seguros, CCS. Madrid*.
- ASCE (1996). RC frames under earthquake loading. *American Society of Civil Engineers*.
- Atalay, M., y Penzien, J. (1975). Behaviour of critical regions of reinforced concrete components as influenced by moment, shear, and axial force. *UCB/EERC-75/19. Earthquake Engineering Research Center, University of California, Berkeley, California*.
- ATC (1982). *An investigation of the correlation between earthquake ground motion and building performance*. Technical report.
- ATC (1996). *Seismic evaluation and retrofit of concrete buildings*. Technical report, ATC-40. Applied Technology Council, Redwood City, California.

- ATC-13 (1985). *Earthquake damage evaluation data for California*. Technical report, ATC-10. Applied Technology Council, Redwood City, California.
- Atkinson, R. H., Amadei, B. P., Saeb, S. y Sture, S. (1989). Response of masonry bed joints in direct shear. *Proceedings of the American Society of Civil Engineers, Journal of Structural Division*, 115(9), 2276–2296.
- Atkinson, R. H., Noland, J. L., y Abrams, D. P. (1985). A deformation failure theory for stack-bond brick masonry prisms in compression. *Proceedings of the Seventh International Brick Masonry Conference, Melbourne, Australia*, 1, 577–592.
- Banda, E., y Correig, M. (1984). The Catalan earthquake of February 2, 1428. *Engineering Geology*, 20(20), 89–97.
- Banon, H., Biggs, J.M., e Irvine, H.M. (1981). Seismic damage in reinforced concrete frames. *Journal of Structural Engineering, ASCE*, 107(9), 1713–1729.
- Banon, H., y Veneziano, D. (1982). Seismic safety of reinforced concrete members and structures. *Earthquake Engineering and Structural Dynamics*, 10(1), 179–193.
- Barbat, A. H., y Paz, M. (1994). International handbook of earthquake engineering, codes, programs and examples. *edited by Mario Paz.*, (pp. 431–446).
- Barbat, A. H., Yépez, F., y Canas, J. A. (1996). Damage scenarios simulation for seismic risk assessment in urban zones. *Earthquake Spectra*, 12(3), 371–394.
- Barbat, A.H. (1998). *El riesgo sísmico en el diseño de edificios*. Calidad Siderúrgica, S.R.L.
- Benuska, L. (1990). Loma Prieta earthquake, reconnaissance report. *Supplement report of Earthquake Spectra, Earthquake Engineering Research Center*, 6.
- Beres, A., El-Borgi, S., White, R. N., y Gergely, P. (1992). *Experimental results of repaired and retrofitted beam-column joint test in lightly reinforced concrete frame buildings*. Technical report, NCEER-92-0025. National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- Bertero, V. (1997). *Performance-based seismic engineering: a critical review of proposed guidelines*. A.A. Balkema, Rotterdam, Brookfield, pp 1-31.: Fajfar P. and Krawinkler, H. Seismic design methodologies for the next generation of codes. Proceedings of the international workshop on seismic design methodologies for the next generation of codes.

- Binda, L., Fontana, A., y Frigerio, G. (1988). Mechanical behaviour of brick masonries derived from unit and mortar characteristics. *Proceedings of the Eighth International Brick and Block Masonry Conference, Dublin, Republic of Ireland.*, 1, 205–216.
- Blume, J. A., Newmark, N. M., y Corning, L. H. (1961). Design of multistorey reinforced concrete buildings for earthquake motions. *Portland Cement Association, Chicago.*
- Bonett, R., Penna, A., Lagomarsino, S., Barbat, A., Pujades, L., Y Moreno, R. (2003). Evaluación de la vulnerabilidad sísmica de estructuras de mampostería no reforzada. Aplicación a un edificio de la zona del Eixample en Barcelona (España). *Revista Internacional de Ingeniería de Estructuras*, 8(2), 91–120.
- Bonett, R., Pujades, L. y Hurtado, J. (2002). Generación de acelerogramas artificiales compatibles con un espectro de respuesta. Aplicación a eventos recientes en Colombia y España. *Revista Internacional de Métodos Numéricos para Cálculo y Diseño en Ingeniería*, 18(2), 297–308.
- Bonett, R., Pujades, L. y Hurtado, J. E (1999). Funciones de fragilidad sísmica de edificios representativos en Manizales. *VII Seminario Internacional y Primer Congreso Nacional de Ingeniería Sísmica. Bogotá.*
- Bousias, S. N., Verzelletti, G., Fardis, M. N., y Magonette, G. (1992). RC columns in cycle biaxial bending and axial load. *Proceedings of the Tenth World Conference on Earthquake Engineering, Madrid.*, 6, 3041–3046.
- Bracci, J. M., Reinhorn, A. M., y Mander, J. B. (1995). Seismic resistance of reinforced concrete frame structures designed for gravity loads: Performance of structural system. *ACI Structural Journal*, 92(5), 597–609.
- Bracci, J.M., Reinhorn, A.M., Mander, J.B., y Kunnath, S.K. (1989). *Deterministic model for seismic damage evaluation of RC structures.* Technical report, NCEER-89-0033, National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- Brencich, A., y Lagomarsino, S. (1998). *A macroelement dynamic model for masonry shear walls.* Technical report, Computer Methods in Structural Masonry - 4. Edited by G. N. Pande, J. Middleton y B. Kralj.
- Bruneau, M. (1994). State of the art report on seismic performance of unreinforced masonry buildings. *Journal of Structural Engineering*, 120(1), 230–251.

- Caicedo, C. (1993). Vulnerabilidad sísmica en zonas urbanas. Aplicación a un sector del Eixample de Barcelona. *Tesis Doctoral, Escuela Técnica Superior de Ingenieros de Caminos, Canales y Puertos, Universidad Politécnica de Cataluña, Barcelona.*
- Calvi, G. M. (1999). A displacement-based approach for vulnerability evaluation of classes of buildings. *Journal of Earthquake Engineering*, 3(3), 411–438.
- Calvi, G. M., Magenes, G. y Pampanin, S. (2002). Relevance of beam-columns joint damage and collapse in RC frame assessment. *Journal of Earthquake Engineering*, 6(Special Issue 1), 75–100.
- Candela, L. (1983). Cartografía geotécnica automática, aplicación al llano de Barcelona. *Tesis Doctoral, Universidad de Granada, Facultad de Ciencias, sección Geológicas, Tomo 1.*, (pp. 293).
- Carr, A.J. (2000). RUAUMOKO. Program for inelastic dynamic analysis.
- CASA (1997). *PROMENVIR: A Meta-computing System for Computational Stochastic Mechanics*. Madrid. Esprit Project Number: 20189.
- Casciati, F. y Faravelli, L. (1985). *Reliability assessment for non-linear random frames*. Technical report, Probabilistic Methods in the Mechanics of Solids and Structures, edited by S. Eggwertz and N.C. Lind. Springer-Verlag, Berlin.
- Celebi, M., y Penzien, J. (1973). *Experimental investigation into the seismic behaviour of the critical regions of reinforced concrete components as influenced by moment and shear*. Technical report, UCB/EERC-73/4. Earthquake Engineering Research Center, University of California, Berkeley, California.
- Chan, W. L. (1955). The ultimate strength and deformation of plastic hinges in reinforced concrete frameworks. *Magazine of Concrete Research*, 7(21), 121–132.
- Chávez, J. (1998). Evaluación de la vulnerabilidad y el riesgo sísmico a escala regional: Aplicación a Cataluña. *Tesis Doctoral. Universidad Politécnica de Cataluña.*
- Chong, W. H., y Soong, T. T. (2000). *Sliding fragility of unrestrained equipment in critical facilities*. Technical report, MCEER-00-0005. Multidisciplinary Center for Earthquake Engineering Research.
- Chung, Y. S., Meyer, C., y Shinozuka, M. (1987). *Seismic assessment of reinforced concrete members*. Technical report, NCEER-87-0022, National Center of Earthquake Engineering Research, State University of New York at Buffalo.

- Chung, Y. S., Meyer, C. y Shinozuka, M. (1989). Modeling of concrete damage. *ACI Structural Journal*, 86(3), 259–271.
- Chung, Y. S., Meyer, C. y Shinozuka, M. (1990). Automated seismic design of reinforced concrete building frames. *ACI Structural Journal*, 87(3), 326–340.
- Chung, Y. S., Shinozuka, M., y Meyer, C. (1988). *SARCF User's guide seismic analysis of reinforced concrete frames*. Technical report, NCEER-88-0044, National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- Chuxian, S. (1985). The influence of joint thickness and the water absorption of bricks on compressive strength of brickwork. *Proceedings of the Seventh International Brick and Masonry Conference.*, 1, 689–697.
- Cid, J. (1998). Zonificación sísmica de la ciudad de Barcelona basada en métodos de simulación numérica de efectos locales. *Tesis Doctoral, Universidad Politécnica de Cataluña, Escuela técnica Superior de Ingenieros de Caminos, Canales y Puertos*.
- Cid, J., Susagna, T., Goula, X., Chavarria, L., Figuras, S., Fleta, J., Casas, A., y Roca, A. (2001). Seismic zonation of Barcelona based on numerical simulation of site effects. *Pure Applied Geophysics*, 158.
- CIMNE (2002). *STAC Program: Stochastic analysis computational*. Technical report, Centro Internacional de Métodos Numéricos en Ingeniería, CIMNE.
- CIMOC y CEDERI (2002). *Microzonificación sísmica de la ciudad de Manizales*. Technical report, Departamento de Ingeniería Civil y Ambiental. Universidad de los Andes. Bogotá - Colombia.
- Clough, R. W., y Johnston, S. B. (1966). Effect of stiffness degradation on earthquake ductility requirements. *Proceedings of the Japan Earthquake Engineering Symposium, Tokyo*.
- Committee, S. V. . (1995). *Performance based seismic engineering of buildings*. Technical report, Prepared by Structural Engineers Association of California, Sacramento, California.
- Corsanego, A. (1995). Recent trends in the field of earthquake damage interpretation. *Proceedings of the 10th European Conference on Earthquake Engineering, Duma*.
- Corsanego, A., y Petrini, V. (1990). Seismic vulnerability of buildings. *Proceedings of the SEISMED 3, Trieste, Italy*.

- Costley, A. C., y Abrams, D. P. (1995). Seismic response of urm buildings. *Proceedings of the Seventh Canadian Masonry Symposium.*, (pp. 72–83).
- COTCA S.A (2002). Informe sobre el estado actual de la estructura del edificio situado en la calle Bergara No. 3 de Barcelona (España).
- Crisafulli, F. J. (1997). Seismic behaviour of reinforced concrete structures with masonry infills. *Tesis Doctoral, Department of Civil Engineering. University of Canterbury. New Zealand.*
- D’Ayala, D., Spence, R., Oliveira, C. y Pomonis, A. (1997). Earthquake loss estimation for europe’s historic town centres. *Earthquake Spectra.*, 13(4), 773–794.
- Decanini, L. D., y Ochat, E. E. (1986). Resultados experimentales del comportamiento estructural de la mampostería. *Jornadas Argentinas de Ingeniería Estructural, Buenos Aires, Argentina.*, 2, 837–872.
- Deodatis, G., y Theoharis, A. (1992). Simulation of seismic ground motion in the New Madrid area using analitically derived frequency-wave number Fourier amplitudes. *Proceedings 10th World Conference Earthquake Engineering.*, 2, 885–887.
- Dhanasekar, M., Page, A. W., y Kleeman, P. W. (1982). The elastic properties of brick masonry. *International Journal of Masonry Construction*, 2(4), 155–160.
- DiPasquale, E., Ju, J-W., Askar, A., y Cakmak, A. S. (1990). Relation between global damage indices and local stiffness degradation. *Journal of Structural Engineering, ASCE.*, 116(5), 1440–1456.
- DiPasquale, E., y Cakmak, A. S. (1987). *Detection and assessment of seismic structural damage.* Technical report, NCEER-87-0015, National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- DiPasquale, E., y Cakmak, A. S. (1988). *Identification of the serviceability limit state and detection of seismic structural damage.* Technical report, NCEER-88-0022 National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- Dolce, M., Kappos, A., Zuccaro, G., y Coburn, A.W. (1995). Report of the EAEE working group 3: Vulnerability and risk analysis. *Technical Report 10th European Conference on Earthquake Engineering, Viena.*, 4, 3049–3077.
- Dowrick, D. (1997). Earthquake resistant design for engineers and architects.

- Drysdale, R. G., Hamid, A. A., y Baker, L. R. (1994). *Masonry structures. Behaviour and design*. Prentice-Hall Inc.
- Dumova, E. J. (2000). Fragility curves for reinforced concrete structures in Skopje (Macedonia) region. *Soil Dynamics and Earthquake Engineering*, 19, 455–466.
- EERI (1994). Expected seismic performance of buildings. *Technical Report, Publication Number SP-10, Earthquake Engineering Research Institute, Oakland CA*.
- Ellingwood, B. R. (2001). Earthquake risk assessment of building structures. *Reliability engineering system safety*, 74, 251–262.
- Espinosa, A. (1996). *Sismicidad histórica, proyecto para la mitigación del riesgo sísmico de Pereira, Dosquebradas y Santa Rosa de Cabal*. Carder-Universidad del Quindío.
- Fajfar, P. (1999). Capacity spectrum method based on inelastic demand spectra. *Earthquake engineering and structural dynamics*, 28, 979–993.
- Fajfar, P. (2000a). A nonlinear analysis method for performance-based seismic design. *Earthquake Spectra*, 16(3), 573–592.
- Fajfar, P. (2000b). A nonlinear analysis method for performance-based seismic design. *Earthquake Spectra*, 16(3), 573–592.
- Fajfar, P. y Gaspersic, P. (1996). The N2 method for the seismic damage analysis of RC buildings. *Earthquake engineering and structural dynamics*, 25, 23–67.
- Faravelli, L. (1988). Stochastic modeling of the seismic excitation for structural dynamics purposes. *Probabilistic Engineering Mechanics*, 3, 189–195.
- FEMA (1999). *Federal Emergency Management Agency. HAZUS 99: Earthquake Loss Estimation Methodology*. Technical Manual.
- FEMA 273 y 274 (1996). NEHRP Guidelines for the seismic rehabilitation of buildings. *Federal Emergency Management Agency (FEMA)*, Washington, D. C.
- Fleta, J., Escuer, J., Goula, X., Olivera, C., Combes, PH, Grellet, B y Granier, TH. (1996). Zonación tectónica, primer estudio de la zonación sismotectónica del NE de la península Ibérica (Cataluña). *Geogaceta*, 20(4), 853–856.
- Florian, A. (1992). An efficient sampling scheme: Updated Latin Hypercube Sampling. *Probabilistic Engineering Mechanics*, 7, 123–130.

- Francis, A. J., Horman, C. B., y Jerrems, L. E. (1971). The effect of joint thickness and other factors on the compressive strength of brickwork. *Proceedings of the Second International Brick Masonry Conference, Stoke-on-Trent, England.*, (pp. 31–37).
- Freeman, S. (1995). A review of practical approximate inelastic seismic design procedures for new and existing buildings. *Proceedings, SEAOC 64th annual convention, Indian Wells, California.*, October 19-21, 311–331.
- Freeman, S. A. (1998). Development and use of capacity spectrum method. *Proceedings of the 6th U.S. National Conference on Earthquake Engineering, Seattle, CD-ROM. EERI. Oakland.*
- Freeman, S. A., Nicoletti, J. P., y Tyrell, J. V. (1975). Evaluation of existing buildings for seismic risk - a case study of puget sound naval shipyard, bremerton, washington. *Proceedings of the U.S. National Conference on Earthquake Engineers, EERI*, (pp. 113–122).
- Fundación ICA (1999). *Edificaciones de Mampostería para Vivienda*. Fundación ICA, A.C.
- Galasco, A., Lagomarsino, S., y Penna, A. (2002). *TreMuri Program: Seismic Analyser of 3D masonry buildings*. Technical report.
- Gambarotta, L., y Lagomarsino, S. (1993). A microcrack damage model for brittle materials. *International Journal Solids and Structures*, 30, 177–198.
- Gambarotta, L., y Lagomarsino, S. (1997). Damage model for the seismic response of brick masonry shear walls. Part II: the continuum model and its applications. *Earthquake Engineering and Structural Dynamics*, 26, 441–462.
- Gasparini, D. A., y Vanmarcke, E. H. (1976). *Simulated earthquake motions compatible with prescribed response spectra*. R76-4, 527, M.I.T. Department of Civil Engineering Research, Cambridge, Massachusetts.
- Giménez, J. (1997). Quantificació de les deformacions verticals recents a l'est de la península Ibèrica a partir d'anivellaments topogràfics de precisió. *Tesis Doctoral, Universitat de Barcelona*.
- Gosain, N. K., Brown, R. H., y Jirsa, J. O. (1977). Shear requirements for load reversals on RC members. *Journal of Structural Division, ASCE*, 103(7), 1461–1476.
- Goula, X., Susagna, T., Figueras, S., Cid, J., Alfaro, A., y Barchiesi, A. (1998). Comparison of numerical simulation and microtremor measurement for the analysis of site effects in the city of Barcelona (Spain). *Proceedings of the XI European Conference on Earthquake Engineering. Balkema. Paris*.

- Gunturi, S. K. (1992). Building specific earthquake damage estimation. *Tesis Doctoral, Stanford University*.
- Gupta, A. y Krawinkler, H. (2000). Estimation of seismic drift demands for frame structures. *Earthquake engineering and structural dynamics*, 29, 1287–1305.
- Hall, J. (1994). *Northridge earthquake January 17, 1994*. Technical report, Preliminary Reconnaissance Report, Earthquake Engineering Research Institute, Publication 94-01, Oakland.
- Hammond, B. L., Lester, W. A. y Reynolds, P. J. (1994). Monte Carlo Methods in Ab Initio Quantum Chemistry. World Scientific.
- Harrada, T. (1992). Stochastic wave-model of seismic ground motion. *Proceedings 10th World Conference Earthquake Engineering, Madrid.*, 2, 811–816.
- Hasselmann, T.K., Eguchi, R., y Wiggins, J. (1980). Assessment of damageability for existing buildings in a natural hazards environment. *Technical Report, No. 80-1332-1, J. H. Wiggins Company, California*.
- Hendry, A. W. (1990). *Structural Masonry*. Macmillan Education Ltd., London.
- Hilsdorf, H. K. (1969). Investigation into the failure mechanism of brick masonry loaded in axial compression. *Proceedings of the International Conference on Masonry Structural System, University of Texas at Austin. Designing, Engineering and Construction with Masonry Products. Edited by F.B. Johnson, Houston, Gulf Publishing.*, (pp. 34–41).
- Hoffman, G. W., Kunnath S. K., Reinhorn, A. M., y Mander, J. B. (1992). *Gravity-load-designed reinforced concrete buildings: seismic evaluation of existing construction and detailing strategies for improved seismic resistance*. Technical report, NCEER-92-0016, National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- Hong, H. P. y Lind, N. C. (1996). Approximate reliability analysis using normal polynomial and simulation results. *Structural Safety*, 18(4), 329–339.
- Housner, G. W., y Jennings, P. C. (1964). Generation of artificial earthquakes. *Journal of the Engineering Mechanics Division, ASCE*, 90, EM1, February.
- Hurtado, J. E. (1998). Stochastic dynamics of hysteretic structures. application to the seismic analysis of base isolated buildings. *Tesis Doctoral, Universidad Politécnic de Cataluña, Barcelona (España)*.
- Hurtado, J. E. (1999). Modelación estocástica de la acción sísmica. Monografías de Ingeniería Sísmica. CIMNE.

- Hurtado, J. E. y Barbat, A. H. (1998). Monte carlo techniques in computational stochastic mechanics. *Archives of Computational Methods in Engineering*, 5(1), 3–30.
- Hwang, H. and Jaw, J.-W. (1990). Probabilistic damage analysis of structures. *Journal of Structural Engineering, ASCE*, 116(7), 1992–2007.
- Hwang, H. H. M. y Huo, J.-R. (1994). Generation of Hazard-Consistent Fragility Curves for Seismic Loss Estimation Studies. *Technical Report, NCEER-94-0015*.
- Hwang, T. H., y Scribner, C. F. (1984). Reinforced concrete member cyclic response during various loadings. *Journal of Structural Division, ASCE*, 110(ST3), 477–489.
- ICC (2003). <http://www.icc.es>. *Instituto Cartográfico de Cataluña, ICC. Barcelona. España*.
- IDEA (2002). Modelación probabilista en la zonificación sísmica de manizales. *Informe final de Investigación presentado a la Alcaldía de Manizales. Instituto de Estudios Ambientales, IDEA. Universidad Nacional de Colombia, sede Manizales*.
- IMAC (1994). Proceedings of the 12th international modal analysis conference. *Technical Report, Honolulu, Hawaii, Sponsored by Society for Experimental Mechanics and Union College*.
- Irizarry, J., Goula, T., y Susagna, T. (2003). Analytical formulation for the elastic acceleration-displacement response spectra adapted to barcelona soil conditions. *Technical Report. Instituto Cartográfico de Cataluña*.
- Irmies, M. T., y Bia, C. T. (2000). Cyclic loading behaviour of a perforated unreinforced masonry wall model. *Proceedings of the 12th World Conference Earthquake Engineering, Auckland, New Zealand*.
- Jeong, G.D. e Iwan, W.D. (1988). Effect of earthquake duration on the damage of structures. *Earthquake engineering and structural dynamics*, 16(8), 1201–1211.
- Kameda, H. and Nojima, N. (1988). Simulation of risk-consistent earthquake motion. *Earthquake engineering and structural dynamics*, 16, 1007–1019.
- Kappos, A. J. (1992). *Seismic damage indices, criteria for local and global collapse, and their analytical implementation*. Technical report, Working Document, CEB Task Group III/2 (Revised version: Jan 1994).

- Kappos, A.J., Stylianidis, K.C. y Michailidis, C.N. (1992). Development of earthquake damage scenarios using a comprehensive analytical method. *Proceedings of the 10th World Conference of Earthquake Engineering, Madrid*.
- Karsan, I. D., y Jirsa, J. O. (1969). Behavior of concrete under compressive loadings. *Journal of Structural Division, ASCE*, 95(ST12), 2543–2563.
- Kawamura, H., Tani, A. y Kambara, H. (1992). Aseismic structural planning system by fuzzy network. *Proceedings of the 10th World Conference of Earthquake Engineering, Madrid*.
- Kent, D. C., y Park, R. (1971). Flexural members with confined concrete. *Proceedings ASCE.*, 97(ST7), 1969–1990.
- Khoo, C. L., y Hendry, A. W. (1973). Strength test on brick and mortar under complex stresses for the development of a failure criterion for brickwork in compression. *Proceedings of the British Ceramic Society.*, 21, 51–66.
- Kim, S. y D'Amore, E. (1999). Push-over analysis procedure in earthquake engineering. *Earthquake spectra*, 15(3), 417–434.
- Kirtschig, K. (1985). On the failure mechanism of masonry subject to compression. *Proceedings of the Seventh International Brick Masonry Conference, Melbourne, Australia.*, 1, 625–629.
- Kitayama, K., Asami, S., Otani, S., y Aoyama, H. (1986). Behaviour of reinforced concrete three-dimensional beam-column connections with slabs. *Transactions of the Japan Concrete Institute*, 8, 38–388.
- Kitayama, K., Otani, S., y Aoyama, H. (1987). Earthquake resistant design criteria for reinforced concrete interior beam-column joints. *Proceedings of the Pacific conference on Earthquake Engineering, Wairakei, New Zealand.*, 1, 315–326.
- Kobayashi, K., Kokusho, S., Takiguchi, K., y Boo, C. (1984). Study on the restoring force characteristics of RC columns to bi-directional deflection history. *Proceedings of the Eighth World Conference on Earthquake Engineering, San Francisco.*, 6, 537–544.
- Kozin, F. (1988). Autorregresive moving average models of earthquake records. *Journal of Probabilistic Engineering Mechanics*, 3(2).
- Kratzig, W. B., Meyer, I. F., y Meskouris, K. (1989). Damage evolution in reinforced concrete members under cyclic loading. *Proceedings 5th International Conference on Structural Safety and Reliability (ICOSAR), San Francisco C.A.*, II, 795–802.

- Krawinkler, H. (1995). New trends in seismic design methodology. *Proceedings of 10th European Conference on Earthquake Engineering, Viena, Balkema, Rotterdam*, 2, 821–830.
- Krawinkler, H., y Nassar, A. (1992). Seismic design based on ductility and cumulative damage demands and capacities. (pp. 23–39).
- Krawinkler, K., y Zohrein, M. (1983). Cumulative damage in steel structures subjected to earthquake ground motions. *Computers Structures*, 16(14), 531–541.
- Kunnath, S. K., Hoffmann, G., Reinhorn, A. M., y Mander, J. B. (1995a). Gravity-load designed reinforced concrete buildings, Part I: Seismic evaluation of existing construction. *ACI Structural Journal*, 92(3), 343–354.
- Kunnath, S. K., Hoffmann, G., Reinhorn, A. M., y Mander, J. B. (1995b). Gravity-load-designed reinforced concrete buildings, Part II: Evaluation of detailing enhancements. *ACI Structural Journal*, 92(4), 471–478.
- Kunnath, S. K., Reinhorn, A. M., y Abel, J. F. (1991). A computational tool for evaluation of seismic performance of reinforced concrete buildings. *Computers Structures*, 41(1), 157–173.
- Kunnath, S. K., Reinhorn, A. M., y Lobo, R. F. (1992). *IDARC version 3.0: A program for the inelastic damage analysis of RC structures*. Technical report, NCEER-92-0022, National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- Kunnath, S. K., Reinhorn, A. M., y Park Y. J.] (1990). Analytical modeling of inelastic seismic response of R/C structures. *Journal of Structural Engineering, ASCE*, 116(4), 996–1017.
- Kurose, Y. (1987). Recent studies on reinforced concrete beam column joints in japan. *PMFSEL Report No. 87-8, Department of Civil Engineering, University of Texas at Austin*.
- Lagomarsino, S., Galasco, A. y Penna, A. (2002). Pushover and dynamic analysis of URM buildings by means of a non-linear macro-element model. International Conference on Earthquake Loss Estimation and Risk Reduction. *Technical presentation. RISK-UE project. Bucharest Meeting*.
- Lagomarsino, S., y Penna, A. (2003). Guidelines for the implementation of the II level vulnerability methodology. WP4: Vulnerability assessment of current buildings. *RISK-UE project: An advanced approach to earthquake risk scenarios with application to different European towns*.

- Lai, S. P. (1982). Statistical characterization of strong ground motions using power spectral density function. *Bulletin of the Seismological Society of America, BSSA*, 72, 259–274.
- Lantada, N. (2003). Aplicación de Técnicas GIS a Estimación de Riesgos Naturales: Riesgo Sísmico. *Tesis Doctoral. Universidad Politécnica de Cataluña. En Redacción.*
- Liu, S. C. (1970). Synthesis of stochastic representations of ground motions. *Bell Systems Technical Journal*, 49, 521–541.
- Loh, C. (1985). Analysis of the spacial variation of seismic waves and ground movements from SMART-1 array data. *Earthquake Engineering and Structural Dynamics*, 13, 561–581.
- Loh, C., y Yeh, Y. (1988). Spatial variation and stochastic modelling of seismic differential ground movement. *Earthquake Engineering and Structural Dynamics*, 16, 583–596.
- López, J., Oller, S., y Oñate, E. (1998). *Cálculo del comportamiento de la mampostería mediante elementos finitos*. Monografía CIMNE No. 46. Centro Internacional de Métodos Numéricos en Ingeniería.
- LOSAN (1978). *Mapa geotécnico de Barcelona, Badalona, Esplugues, L'Hospitalet, Sant Adrià, Sta. Coloma. 1 mapa, p. 32.*
- Lybas, J., y Sozen, M. (1977). *Effect of beam strength and stiffness on dynamic behavior of reinforced concrete coupled walls*. Technical report, Civil Engineering Studies, Structural Research Series No. 444. University of Illinois, Urbana.
- Maña, F. (1997). Vulnerabilitat sísmica dels edificis de la ciutat de Barcelona. *Informe Técnico. Institut de Tecnologia de la Construcció de Catalunya, Barcelona.*
- Ma, S. Y., Bertero, V. V., y Popov, D. P. (1976). *Experimental and analytical studies on the hysteretic behaviour of reinforced concrete rectangular and T-beams*. Technical report, EERC 76-2, Earthquake Engineering Research Center, University of California, Berkeley.
- Magenes, G., y Calvi, G. M. (1997). In-plane seismic response of brick masonry walls. *Earthquake Engineering and Structural Dynamics*, 26, 1091–1112.
- Mander, J. B., Priestley, M. J. N., y Park, R. (1988). Theoretical stress-strain model for confined concrete. *Journal of Structural Engineering, ASCE*, 114(8), 1804–1826.

- Mander, J. B., Waheed, S. M., Chaudhary, M. T. A. y Chen, S. S. (1993). *Seismic performance of shear critical reinforced concrete bridge piers*. Technical report, NCEER-93-0010, State University of New York, Buffalo, N.Y.
- Mann, W., y Muller, H. (1982). Failure of shear-stressed masonry - An enlarged theory, test and application to shear walls. *Proceedings of the British Ceramic Society.*, 30, 223–235.
- McNary, W. S., y Abrams, D. P. (1985). Mechanics of masonry in compression. *Proceedings of the American Society of Civil Engineers, Journal of Structural Engineering.*, 111(4), 857–870.
- Megget, L. M. (1974). Cyclic behaviour of exterior reinforced concrete beam-column joints. *Bulletin of New Zealand National Society of Earthquake Engineering*, 7(1).
- Mehlmann, M. y Oppermann, B. (1988). The role of masonry mortar and rendering mortar in modern masonry construction. *Proceedings of the Eighth International Brick and Block Masonry Conference, Dublin, Republic of Ireland*, 1, 139–149.
- Mena, U. (2002). Evaluación del riesgo sísmico en zonas urbanas. *Tesis Doctoral. Universidad Politécnica de Cataluña.*
- Ministerio de Fomento (2000). Norma de Construcción Sismorresistente NCSE-94: Parte general y Edificación.
- Ministerio de Fomento (2002). Norma de Construcción Sismorresistente, NCSE-02.
- Ministerio de la Vivienda (1963). Norma M. V. 101-1962. Acciones en la edificación. Decreto 17 (195/1963), Madrid, España.
- Miranda, E. (2000). Inelastic displacement ratios for displacement-based earthquake resistant design. *Proceedings of the 12th World Conference on Earthquake Engineering, Auckland, CD-ROOM. Paper 1096, New Zealand Society for Earthquake Engineering.*
- Miranda, E. y Bertero, V. (1994). Evaluation of strength reduction factors for earthquake resistant design. *Earthquake Spectra*, 10, 357–379.
- Moehle, J. P., y Mahin, S. A. (1991). Observations on the behavior of reinforced concrete buildings during earthquakes. *American Concrete Institute publication SP-127, Earthquake-Resistant Concrete Structures - Inelastic Response and Design. Editado por S.K. Ghosh.*

- Moreno, R., Bonett, R., Barbat, A., y Pujades, L. (2003). Capacity and fragility of the Barcelona's residential buildings. *Report by CIMNE workin group. Preliminar Report by RISK-UE project. WP4 Vulnerability assessment of current buildings.*
- Mork, K. J. (1992). Stochastic analysis of reinforced concrete frames under seismic excitation. *Soil Dynamics and Earthquake Engineering*, 11(3), 145–161.
- Newmark, N. M. y Hall, W. J. (1987). *Earthquake spectra and design*. Technical report, Earthquake Engineering Research Institute, EERI.
- Newmark, N. M. y Rosenbluet, E. (1971). *Fundamentals of Earthquake Engineering*. Englewood Cliffs: Prentice-Hall.
- Nielsen, S. R. K., Koyluoglu, H. U. y Cakmak, A. S. (1992). One and two-dimensional maximum softening damage indicators for reinforced concrete structures under seismic excitation. *Soil Dynamics and Earthquake Engineering*, 11(4), 435–443.
- nisse (2003). <http://nisee.berkeley.edu/images/servlet/EquisListQuake>. *National Information Service for Earthquake Engineering, University of California, Berkeley, USA.*
- Oliveira, C., Riera, A., Lambert, J., Banda, E., y Alexandre, B. (1994). Els terratrèmols de l'any 1373 al Pirineu: Efects a Espanya i França. *Monografies Número 3. Publicació del Servei Geològic de Catalunya. Barcelona.*
- Olivera, C., Redondo, E., Riera, A., Lambert, J., y Roca, A. (1998). Problems in assessing focal parameters to earthquake sequences from historical investigation: The 1427 earthquakes in Catalonia. *Actas de la Asamblea Hispano-Portuguesa de Geodesia y Geofísica. Almería.*
- Otani, S. (1974). Inelastic analysis of R/C frame structures. *Journal of Structural Division, ASCE*, 100(ST7), 1433–1449.
- Otani, S. (1980). Non-linear dynamic analysis of reinforced concrete building structures. *Canadian Journal Civil Engineering*, 7(2), 333–344.
- Otani, S. (1981). Hysteresis models of reinforced concrete for earthquake response analysis. *Journal Faculty of Engineering, University of Tokyo, XXXVI*, 2(2), 125–159.
- Ozcebe, G., y Saatcioglu, M. (1989). Hysteretic shear model for reinforced concrete members. *Journal of structural engineering*, 115(1), 132–148.

- Pantazapoulou, S. J., y Bonacci, J. F. (1992). Consideration of questions about beam-column joints. *ACI Structural Journal*, 89(1), 27–36.
- Pantelides, C. P., Clyde, C., y Reaveley, L. D. (2002). Performance-based evaluation of reinforced concrete building exterior joints for seismic excitation. *Earthquake spectra*, 18(3), 449–480.
- Paret, T. F., Sasaki, K. K., Eilbeck, D. H. y Freeman, S.A. (1996). Approximate inelastic procedures to identify failure mechanisms from higher mode effects. *Proceedings of the 11th World Conference on Earthquake Engineering. Madrid*.
- Paricio, A. (2001). *Secrets d'un sistema constructiu: l'Exemple*. Ediciones UPC.
- Park, R. (1973). Theorisation of structural behaviour with a view to defining resistance to ultimate deformability. *Bulletin of New Zealand Society for Earthquake Engineering*, 6(2), 52–70.
- Park, R. (1986). Ductile design approach for reinforced concrete frames. *Earthquake spectra*, 2(3), 565–619.
- Park, R., Priestley, M. J., y Gill, W. G. (1982). Ductility of square-confined concrete columns. *Journal of Structural Division, Proceedings ASCE*, 108(ST4), 929–950.
- Park, R., y Hopkins, D. C. (1989). United States/New Zealand/Japan/China collaborative research project on the seismic desing of reinforced concrete beam-column-slab joints. *Bulletin of the New Zealand National Society for Earthquake Engineering*, 22(2), 122–126.
- Park, R. y Paulay, T. (1975). *Reinforced concrete structures*. John Wiley Sons. New York, 769 p.
- Park, R. y Paulay, T. (1994). *Estructuras de concreto reforzado*. LIMUSA. Noriega Editores. México.
- Park, Y. -J. y Ang, A. H. -S. (1985). Mechanistic seismic damage model for reinforced concrete. *Journal of Structural Engineering, ASCE*, 111(4), 722–739.
- Park, Y. J., Ang, A. H-S. y Wenn, Y. K. (1987). Damage limiting aseismic design of buildings. *Earthquake Spectra*, 3(1), 1–26.
- Paulay, T., Park, R., y Priestley, M. J. N. (1978). Reinforced concrete beam-column joints under seismic actions. *Journal ACI*, 75(11), 585–593.
- Paulay, T., y Priestley, M. J. N. (1992). *Seismic design of reinforced concrete and masonry buildings*. Edited by John Wiley Sons, INC.

- Penzien, J. (1993). Seismic design criteria for transportation structures, structural engineering in natural hazards mitigation. *Proceedings ASCE Structures Congress, Irvine, CA.*, 1, 4–36.
- Pessiki, S. P., Conley, C. H., Gergely, P., y White, R. N. (1990). *Seismic behaviour of Lightly-reinforced concrete column and beam-column joint details*. Technical report, NCEER-90-0014, National Center for Earthquake Engineering Research, State University of New York at Buffalo.
- Petrovski, J., Ristic, D. y Nocevski, N. (1992). Evaluation of vulnerability and potential seismic risk level of buildings. *Proceedings of 10th World Conference of Earthquake Engineering, Madrid*.
- Pinto, A. V., Verzeletti, G., Negro, P., y Guedes, J. (1995). *Cyclic testing of a squat bridge pier*. Technical report, EUR 16247 EN, European Laboratory for Structural Assessment (ELSA), Ispra, Italy.
- Polhemus, N. W., y Cakmak, A. S. (1981). Simulation of earthquake ground motions using autorregressive moving average models. *Earthquake Engineering and Structural Dynamics*, 9, 343–354.
- Pollock, D. (1999). *A handbook of time-series analysis, signal processing and dynamics*. San Diego: Academic Pres.
- Prakah, V., Powel, G. H. y Campbell, S. (1993). *DRAIN-2DX*. University of California, Berkeley.
- Presidencia del Gobierno, comisi3n interministerial (1969). *Norma sismorresistente P.G.S.-1 (1968). Decreto 106, Madrid, Espa1a*.
- Presidencia Del Gobierno, Comisi3n Interministerial (1974). *Norma sismorresistente P.D.S.-1. Decreto 3209, Madrid, Espa1a*.
- Press, W. H., Teukolsky, S. A., Vetterling, W. T. y Flannery, B. P. (1992). *Numerical Recipes in FORTRAN*. Cambridge: Cambridge University Press, 2nd edition.
- Priestley, M. (1981). *Spectral analysis and time series*. Academic Press, London.
- Priestley, M. B. (1965). Evolutionary spectra and non-stationary process. *Journal Royal Statistic Society*, 27, 204–237.
- Priestley, M. J. N., y Park, R. (1987). Strength and ductility of concrete bridge columns under seismic loadings. *ACI Structural Journal*, 84(1), 61–76.
- Qamaruddin, M., y Chandra, B. (1991). Behaviour of unreinforced masonry buildings subjected to earthquakes. *TMS Journal*, (February), 47–55.

- Rabbat, B., Daniel, J. I., y Weinnann, T. L. (1986). Seismic behaviour of light weight and normal weight concrete columns. *ACI Journal*, 83, 69–78.
- Raghavendrchar, M., y Aktan, A. E. (1992). Flexibility by multireference impact testing for bridge diagnostic. *Journal of Structural Engineering, ASCE*, 118(8), 2186–2203.
- Rencher, A. (1995). *Methods of multivariate analysis*. John Wiley and Sons. New York.
- Ridell, R., y Newmark, N. M. (1979). Force-deformation models for nonlinear analysis. *Journal of Structural Division, ASCE*, 105(ST12), 2773–2778.
- Ristic, D., Yamada, Y., y Iemura, H. (1986). Effects of variation of axial forces to hysteretic earthquake response of reinforced concrete structures. *Proceedings of the Eighth European Conference on Earthquake Engineering, Lisboa.*, 7, 49–56.
- Robledo, B.E. (1986). Manizales a través de la fotografía. <http://www.banrep.gov.co/blaavirtual/boleti4/bol7/maniza.htm>. *Biblioteca Virtual de la República de Colombia.*, Volumen XXIII(7).
- Roufaiel, M. S. L., y Meyer, C. (1987). Analytical modelling of hysteretic behaviour of R/C frames. *Journal of Structural Division, ASCE*, 113(3), 429–444.
- Roy, H. E. H., y Sozen, M. A. (1964). Ductility of concrete. *Proceedings of the International Symposium on Flexural Mechanics of Reinforced Concrete, ASCE-ACI.*, (pp. 213–224).
- Saatcioglou, M., Derecho, A. T., y Corley, W. G. (1983). Modelling hysteretic behaviour of coupled walls for dynamic analysis. *Earthquake Engineering and Structural Dynamics*, 11, 711–726.
- Saatcioglou, M., y Ozcebe, G. (1989). Response of reinforced concrete columns to simulate seismic loading. *ACI Structural Journal*, 86(1), 3–12.
- Sahlin, S. (1971). *Structural masonry*. Prentice-Hall Inc., New Jersey.
- Saiidi, M., y Sozen, M. A. (1981). Simple nonlinear seismic analysis of R/C structures. *Journal of Structural Division, ASCE*, 107, 937–952.
- San Bartolome, A. (1998). *Construcciones de Albañilería: Comportamiento Sísmico y Diseño Estructural*. Fondo Editorial de la Pontificia Universidad Católica del Perú.
- Sargin, M., Ghosh, S. K., y Handa, V. K. (1971). Effects of lateral reinforcement upon the strength and deformation properties of concrete. *Magazine of Concrete Research*, 23(75-76), 99–110.

- Sarria, A. (1995). *Ingeniería sísmica*. Ediciones Uniandes.
- SC Y SEAOC (1989). *Recommended lateral force requirements and commentary*. Seismology Committee, Structural Engineers Association of California, San Francisco, California.
- Schubert, P. (1988). The influence of mortar on the strength of masonry. *Proceedings of the Eighth International Brick and Block Masonry Conference, Dublin, Republic of Ireland.*, 1, 162–174.
- Secanell, R. (1999). *Avaluació de la perillositat sísmica a catalunya: anàlisi de sensibilitat per a diferents models d'ocurrència i parameters sísmics*. Tesis Doctoral. Universidad Politècnica de Catalunya.
- Secanell, R., Goula, X., Susagna, T., Fleta, J., y Roca, A. (1998). Analysis of seismic hazard in Catalonia (Spain) through different probabilistic approaches. *Proceedings of the XI European Conference on Earthquake Engineering*. Balkema. Paris.
- Sezen, H., Whittaker, A. S., Elwood, K. J., y Mosalam, K. M. (2003). Performance of reinforced concrete buildings during the August 17, 1999 Kocaeli, Turkey earthquake, and seismic design and construction practise in Turkey. *Engineering Structures*, 25, 103–114.
- Sheikh, S. A., y Uzumeri, S. M. (1980). Strength and ductility of confined concrete columns. *Proceedings ASCE.*, 106(ST5), 1079–1102.
- Shrive, N. G. (1991). Materials and material properties, reinforced and prestressed masonry. (pp. 25–54).
- Singhal, A. y Kiremidjian, A.S. (1995). *Method for developing motion damage relationship for reinforced concrete frames*. Technical report, NCEER-95-0008, National Center for Earthquake Engineering Research.
- Sinha, B. P. (1983). Factors affecting the brick-mortar interface bond strength. *International Journal of Masonry Construction*, 3(1), 14–18.
- Sinha, B. P., Gerstle, K. H., y Tulin, L. G. (1964). Stress-strain behaviour for concrete under cyclic loading. *Journal ACI*, 61(2), 195–211.
- Sinha, B. P., y Pedreschi, R. (1983). Compressive strength and some elastic properties of brickwork. *International Journal of Masonry Construction*, 3(1), 19–25.
- Soliman, M. T. M., y Yu, C. W. (1967). The flexural stress-strain relationship of concrete confined by rectangular transverse reinforcement. *Magazine of Concrete Research*, 19(61), 223–238.

- Soong, T.T. y Grigoriu, M. (1993). *Random vibration of structural and mechanical systems*. Englewood Cliffs: Prentice Hall.
- Spurr, S.D., y Paulay, T. (1984). *Post-elastic behavior of reinforced concrete frame-wall components and assemblages subjected to simulated seismic loading*. Technical report, 84-19, Departament of Civil Engineering, University of Canterbury, Christchurch, Nueva Zelanda.
- Střckl, S., y Hofmann, P. (1988). Test on the shear bond behaviour in the bed-joints of masonry. *Proceedings of the Eighth International Brick and Block Masonry Conference, Dublin, Republic of Ireland.*, 1, 292–303.
- Stephens, J. E. y Yao, J. T. P. (1987). Damage assessment using response measurements. *Journal of structural division, ASCE*, 113(4), 787–801.
- Stone, W. C., y Taylor, A. W. (1993). *Seismic performance of circular bridge columns designed in accordance with AASHTO/CALTRANS standards*. Technical report, NIST Building Science Series 170, National Institute of Standards and Technology, Gaithersburg MD.
- Sues, R. H., Wen, Y. K., y Ang, A. H.-S. (1983). *Stochastic seismic performance evaluation of buildings*. Technical report, Structural Research Series, 506, University of Illinois, Department of Civil Engineering.
- Suriñach, E., y Roca, A. (1985). Sismicidad en la región NE de la península Ibérica. *Revista de Geofísica*, 41, 271–276.
- Susana, T., y Goula, X. (1998). Catàleg de sismicitat. Atlas sísmic de Catalunya. *Institut Cartogràfic de Catalunya, Vol. I*.
- Suzuki, N., Otani, S., y Kobayashi, H. (1984). Three-dimensional beam-column subassemblages under bidirectional earthquake loadings. *Proceedings of the Eighth World Conference on Earthquake Engineering, San Francisco.*, 6, 453–460.
- Takeda, T., Sozen, M. A., y Nielsen, N. N. (1970). R/C response to simulated earthquakes. *Journal of Structural Division, ASCE*, 96(ST12), 2557–2573.
- Takizawa, H., y Aoyama, H. (1976). Biaxial effects in modelling earthquake response of R/C structures. *Earthquake Engineering and Structural Dynamics*, 4, 523–552.
- Tamura, K., Winterstein, S., y Shah, H. (1992). Random field models of spatially varying ground motions and the estimation of differential ground motions. *Proceedings of the Tenth World Conference Earthquake Engineering.*, 2, 863–866.

- Townsend, W. H., y Hanson, R. D. (1977). Reinforced concrete connection hysteresis loops. *ACI Publication SP53-13: Reinforced Concrete Structures in Seismic Zones*, (pp. 351–370).
- UBC (1988). Uniform Building Code, International Conference of Building Official, Whittier, California.
- Universidad de los Andes (2002). Informe de la amenaza sísmica de Manizales. Análisis preliminar de espectros de amplitudes y estimación de la fase intensa de los movimientos.
- Uzumeri, S. M. (1977). Strength and ductility of cast-in-plane beam-column joints. *ACI Publication SP 53-12: Reinforced Concrete Structures in Seismic Zones*, (pp. 293–350).
- Vanmarcke, E. H. y Lai, S. P. (1980). Strong-motion duration and RMS amplitude of earthquake records. *Bulletin of the Seismological Society of America*, 70, 1293–1307.
- Vidic, T., Fajfar, P. y Tsopelas, P. (1994). Consistent inelastic design spectra: strength and displacement. *Earthquake engineering and structural dynamics*, 23, 502–521.
- Wakabayashi, M. (1986). *Design of Earthquake-Resistant Buildings*. McGraw Hill C., New York.
- Wang, M. L., y Shah, S. P. (1987). Reinforced concrete hysteresis model based on the damage concepts. *Earthquake Engineering and Structural Dynamics*, 15, 993–1003.
- Whitman, R.V., Reed, J.W. y Hong, S.-T. (1974). Earthquake damage probability matrices. *Proceedings of the fifth World Conference on Earthquake Engineering*, (pp. 2531).
- Yamaguchi, N., y Yamazaki, F. Fragility curves for buildings in japan based on damage surveys after the 1995 kobe earthquake. *Proceedings of the 12th World Conference on Earthquake Engineering, Auckland, New Zealand.*, (2451).
- Yamaguchi, N., y Yamazaki, F. (2000). Fragility curves for buildings in Japan based on damage surveys after the 1995 Kobe earthquake. *Proceedings of the 12th World Conference Earthquake Engineering, Auckland, New Zealand*.
- Yeh, C.H. (1989). *Modelling of nonstationary earthquake ground motion and biaxial and torsional response of inelastic structures*. PhD thesis, University of Illinois.

- Yeh, C.H. y Wen, Y.K. (1990). Modelling of nonstationary ground motion and analysis of inelastic structural response. *Structural Safety*, 8, 281–298.
- Yépez, F. (1996). Metodología para la evaluación de la vulnerabilidad y riesgo sísmico de estructuras aplicando técnicas de simulación. Tesis doctoral. Universidad Politécnica de Cataluña. Barcelona-España.
- Zagajeski, S. W., Bertero, V. V., y Bouwkamp, J. G. (1978). *Hysteretic behavior of reinforced concrete columns subjected to high axial and cyclic shear forces*. Technical report, EERC 78-05, Earthquake Engineering Research Center, University of California, Berkeley, California.
- Zárate, F., Hurtado, J.E., Oñate, E. y Rodríguez, J.A. (2002). Un entorno para análisis estocástico en mecánica computacional. *Métodos numéricos en ingeniería y ciencias aplicadas*.
- Zhuge, Y., Corderoy, J., y Thambiratnam, D. (1996). Behavior of unreinforced brick masonry under lateral (cyclic) loading. *TMS Journal*, (pp. 55–62).

