

ERNESTO VÁZQUEZ-MARTÍNEZ

evazquezmtz@gmail.com

EDUCATION

PhD	University of Nuevo Leon, Electrical Engineering Thesis: "Methodology to protection operation analysis for fault Place diagnosis in power systems"	Dec 1994
MS	University of Nuevo León, Electrical Engineering	Apr 1991
BS	University of Nuevo León, Electronic and Communications Engineering, Graduate with honors	Nov 1988

RESEARCH INTERESTS

- Power system protection.
- Application of artificial intelligence techniques in power systems.

HONORS AND AWARDS

- National researcher, level I (2015 - 2017) from CONACyT (equivalent to NSF in USA)
- XXV National contest of research thesis (2013-2015), second place, PhD thesis "Algorithm to determine voltage safety in a power system based on wide area systems". (in Spanish)
- National researcher, level II (2010 - 2013) from CONACyT (equivalent to NSF in USA)
 - National researcher, level I, (2002 – 2009) (equivalent to NSF in USA)
- XXIV National contest of research thesis (2007-2008), second place, MSc thesis "Methodology for fault section diagnosis in power systems". (in Spanish)
- XXIII National contest of research thesis (2005-2006), second place, MSc thesis "A new distance protection algorithm based in pattern recognition of traveling waves" (in Spanish)
- 2004 UANL contest research thesis, first place, MSc thesis "A new distance protection algorithm based in recognition pattern of traveling waves" (in Spanish)
- 1995 Technological development prize, Nuevo León State distinction, project "SIDUF-TR a real time fault section diagnosis system implemented in control centers in México". (in Spanish)
- 1994 UANL research prize, PhD thesis "A methodology for protection operation analysis to fault section estimation in real time" (in Spanish)

RESEARCH EXPERIENCE

University of Nuevo León, México Researcher	1995-present
University of Nuevo León, México Power system lab coordinator	1997-2002
University of Manitoba, Canada Visiting professor working with RTDS company.	2000-2001
University of Alberta, Canada Research assistant	2011-2012

PROJECTS

UANL internal projects (8), as support PhD and MSc students (50,000.00 USD)

CONACyT projects (7) (250,000 USD)

1. Identification of inrush current in power transformers based on modal analysis (2016).
2. Identification of inrush current in power transformers based on non-linear mathematical transformations (2010).
3. Pattern recognition techniques applied for transmission lines protection (2008).
4. Discrimination between faults and power swings based on support vector machines (2004).
5. A new traveling wave protection for transmission lines (2001).
6. A power swings condition identification by artificial intelligence methods (2000).
7. Neural network relay for transmission lines protection (1999).

Industry projects (700,000 USD)

- Development a differential relay for power transformer (2015-2016).
- Development a remote terminal unit with protection function for distribution systems (2009-2011).
- Benchmark and testing case library for RTDS, University of Manitoba (2000-2001).
- SIDUF-TR, real time system for fault section diagnosis for CFE (Electrical company in México) (1995-1998).

TEACHING EXPERIENCE

Undergraduate courses. Averaging 50 students per semester, covering the following task: developed quizzes, exams, and homework, revised the syllabus to meet accreditation standards.

- Neural networks applications
- Expert systems
- Electric machinery
- Power system analysis

Graduate courses. Averaging 10 students per semester, covering the following task: developed quizzes, exams, homework and short projects, revised the syllabus to meet accreditation standards.

- Power system protection
- Electromagnetic transient
- Electric machines
- Artificial intelligence applied to power systems
- Power systems control and operation
- Digital signal processing

Training courses for industry. Teach courses for electrical engineering of power supply companies, professors and students of universities. As part of the courses, develop computer practice using simulation programs as Aspen, PSCAD, etc.

111 training courses in México, Venezuela, República Dominicana, Guatemala, El Salvador, Panama and Perú

- Power system protection
- Power system control and operation
- Power system stability
- Generator protection
- Transmission line protection
- Digital protection for power systems

STUDENTS ADVISED

Undergraduate

- 1999. Lilian Guadalupe Ramírez Moreno. Application of artificial intelligence in the industry.
- 2002. José Alfredo Pérez Rodríguez. Discrimination between fault and inrush current using neural networks.
- 2002. Víctor Hugo Pozo López. Distance relay testing.

MSc

- 1999. Alejandro Hernández Garza and Jorge Homero Escamilla Guerrero. State Observers for temperature measurement in an extrusion process.

- 2000. Bruno López Takeyas and Jaime D. Johnston Barrientos. Genetic algorithms for academic schedule in the university.
- 2001. Oscar Alfonso Reyes Martínez. Synchronous generator model with saturate transformer for over voltages studies.
- 2002. Josué Rósemberg Coutiño Ozuna. Identification of power swing using neural networks.
- 2003. Jesús Roberto Martínez Rodríguez. Hi-Pot test for cable terminals evaluations.
- 2004. Raúl de Jesús Gómez Morales. A new differential protection algorithm based on radial base neural networks (RBF).
- 2004. Jorge Castruita Ávila. Distance protection for transmission lines using pattern recognition of traveling wave.
- 2004. Jesús Alberto González Murrieta. Fault locator in transmission lines by characteristics method.
- 2005. Iván Isaúl Mijares Contreras. Application of PCA for transformer fault detection.
- 2007. Alicia Marisol Ramírez Castillo. Application of PCA for transformer fault detection. A simplified method.
- 2007. Jesús Gildardo Treviño Chávez. Underground protection schemes for distribution systems.
- 2007. Jorge Armando Solís Dávila. Distribution power system planning using genetic algorithms.
- 2008. Ricardo Rosas Molina. A new methodology for fault place diagnosis in power systems.
- 2009. Félix Enrique Zamarrón Gaona. CCA applied for transformer differential protection.
- 2009. Salome Alfredo Garza Rodríguez. Lab implementation of differential protection of power transformer based on CCA.
- 2011. Salvador de la Ree Reyna. Fault place diagnosis in power system using circuit breaker reach zones.
- 2014. Luis Alberto Zatarain Morua. Fuzzy power flow applied in Mexican power system.
- 2015. Héctor Esponda Hernández. Inrush current identification using modal analysis.
- 2015. Humberto Calderón Mendoza. Differential busbar protection.
- 2015. Miguel Ángel Chávez Pruneda. Settings of 64N relay in auto-transformers.
- 2015. Jesús Ignacio Espinoza Aguilar. Fault location system in transmission lines using traveling wave detectors.
- 2016. Ever Benjamín Huerta Leija. Review of fault location algorithm in transmission lines.
- 2016. Simón Guadalupe Torres Paz. A new phase selection algorithm for single-pole tripping based on modal analysis.
- In process. Carlos Alberto González Rocha. Fault section diagnosis using synchrophasor data.
- In process. José Roberto Balderas Garza. New power swing blocking in distance relays.

- In process. Saúl Jonathan Jiménez Martínez. Thevenin equivalent estimation in real-time.

PhD

- 2013. Roberto Salinas Navarro. Power system security index based on wide area measurements.
- 2016. Mauro Jesús Álvarez Ramos. A PMUs placement methodology based on inverse of connectivity and critical measurements.
- In process. Jorge Luis Arizpe Islas. Traveling distance protection for transmission lines using current signals.
- In process. Héctor Esponda Hernández. Universal differential protection.

PUBLICATIONS

Proceedings papers

- D. Guillén, H. Esponda, E. Vázquez and G. Idárraga-Ospina, "Algorithm for transformer differential protection based on wavelet correlation modes," in *IET Generation, Transmission & Distribution*, vol. 10, no. 12, pp. 2871-2879, 9 2 2016. ISSN: 1751-8687. DOI: 10.1049/iet-gtd.2015.1147. FI=1.353.
- A. Zamora-Mendez, M. R. A. Paternina, E. Vázquez M., J. M. Ramirez and J. A. la O de Serna, "Distance Relays Based on the Taylor–Kalman-Fourier Filter," in *IEEE Transactions on Power Delivery*, vol. 31, no. 3, pp. 928-935, June 2016, ISSN 0885-8977. DOI: 10.1109/TPWRD.2015.2392120. FI=2.032.
- Zamora, A.; Ramirez, J.M.; Arrieta Paternina, M.R.; Vazquez-Martinez, E., "Digital filter for phasor estimation applied to distance relays," in *Generation, Transmission & Distribution, IET* , vol.9, no.14, pp.1954-1963, 11 5 2015, ISSN 1751-8687. DOI: 10.1049/iet-gtd.2014.1220. FI=1.353.
- M.J. Alvarez, F.S. Sellschopp, E. Vazquez, A PMUs placement methodology based on inverse of connectivity and critical measurements, *International Journal of Electrical Power & Energy Systems*, Volume 68, June 2015, Pages 336-344, ISSN 0142-0615. <http://dx.doi.org/10.1016/j.ijepes.2014.12.055>. FI=2.587.
- Gonzalez, Carlos; Vazquez, Ernesto; Sellschopp, Francisco, "Fault location diagnosis based on synchronized phasor measurements," *Latin America Transactions, IEEE (Revista IEEE America Latina)* , vol.13, no.3, pp.645,650, March 2015, ISSN: 1548-0992. DOI: 10.1109/TLA.2015.7069087. FI=0.436.
- Vazquez Martinez, E.; de la O Serna, J.A., "Smart grids Part 1: Instrumentation challenges," *Instrumentation & Measurement Magazine, IEEE* , vol.18, no.1, pp.6,9, February 2015. ISSN 1094-6969. DOI: 10.1109/MIM.2015.7016673. FI=0.759.
- De la O Serna, J.A.; Vazquez Martinez, E., "Smart grids Part 2: Synchrophasor measurement challenges," *Instrumentation & Measurement Magazine, IEEE* , vol.18, no.1, pp.13,16, February 2015. ISSN 1094-6969. DOI: 10.1109/MIM.2015.7016675. FI=0.759.
- Bing Xia, Yang Wang, Ernesto Vázquez, Wilsun Xu, Daniel Wong, Michael Tong, "Estimation of fault resistance using fault record data," *IEEE Transactions on Power Delivery*, vol. 30, No. 1, Feb. 2015, pp. 153-160, ISSN 0885-8977. DOI: 10.1109/TPWRD.2014.2355041. FI=2.032.
- A.Conde, E. Vázquez, "Application of a proposed overcurrent relay in radial distribution networks," *Electric Power System Research*, 81, (2011), 570-579, ISSN 0378-7796. <http://dx.doi.org/10.1016/j.epsr.2010.10.026>

- Arturo Conde Enríquez, Ernesto Vázquez Martínez, Juan Carlos Escobar Martínez, "Time coordination by time adaptive function," *Computation and Systems Proceedings (IPN)*, Vol. 13, No. 3, pp. 247-256, Jan-Mar 2010, ISSN 1405-5546.
- A. Conde, E. Vázquez, P.V. Cantú, "Diseño teórico y simulación de un relevador de sobrecorriente con capacidades dinámicas de ajuste," *Engineering, Research and Technology Proceedings (UNAM)*, Vol X, Num 2, pp 155-165, 2010, ISSN 1405-7743.
- E. Vázquez, I. I. Mijares, O. L. Chacón, A. Conde, "Transformer Differential Protection using Principal Component Analysis," *IEEE Transactions in Power Delivery*, vol. 23, no. 1, January 2008, pp. 67-72.
- A. Conde, E. Vázquez, "Operation logic proposed for time overcurrent relays," *IEEE Transactions in Power Delivery*, vol. 22, no. 4, October 2007, pp. 2034-2039.
- E. Vázquez, J. Castruita, O. Chacón, A. Conde, "A New Approach Traveling Wave Distance Protection, Part 1: Algorithm," *IEEE Transactions in Power Delivery*, vol. 22, no. 2, April 2007, pp. 795-800.
- A. Conde, E. Vázquez, "Functional structure for performance improvement of time overcurrent relays," *Electric Power Components & Systems*, vol. 35, no. 3, March 2007.
- A. Conde E. Vázquez, "Sensitivity improvement of time overcurrent relays", *Electric Power Systems Research*, vol. 77, February 2007, pp 119-124.
- A. Conde E. Vázquez, "Enhanced Time Overcurrent Coordination", *Electric Power Systems Research*, vol. 76, April 2006, pp 457-465.
- A. Conde E. Vázquez, H. Altuve, "Time overcurrent adaptive relay," *International Journal of Electric Power & Energy Systems*, vol. 25, no. 10, Diciembre 2003, pp. 841-847.
- E. Vázquez, "A travelling wave distance protection using principal component analysis," *International Journal of Electrical Power & Energy Systems*, vol. 25, no. 6, Julio 2003, pp. 471-479.
- Altuve H., Chacón L., Vázquez E., Posadas E., Sánchez E., "Neural-network-based fault location estimator for transmission line protection," *Journal of Intelligent & Fuzzy Systems* 7 (1999) 159-171, IOS Press.
- Vázquez E., Chacón O., Altuve H., "An on-line expert system for fault section diagnosis in power systems," *IEEE Trans. On Power Systems*, vol. 12, no. 1, pp. 357-362, February 1997.

- Altuve H., Díaz I., Vázquez E., "Fourier and Walsh digital filtering algorithms for distance protection," IEEE Transactions on Power Systems, vol. 11, no. 1, pp. 457-462, February 1996.

Conference papers

- S. Torres, H. Esponda, M. Andrade, E. Vázquez, M.R.A. Paternina, A. Zamora, Juan M. Ramírez, "Unblocking function of distance relay during power swing based on modal analysis," Proceedings of 2016 IEEE Transmission and Distribution Latin America, Morelia, Michoacán, México, September 21-23, 2016.
- J. Rios, A. Zamora, M.R.A. Paternina, A. López, E. Vázquez, "Secondary voltage control areas through energy levels," Proceedings of 2016 IEEE Transmission and Distribution Latin America, Morelia, Michoacán, México, September 21-23, 2016.
- Ernesto Vázquez, Juan M. Ramírez, A. Zamora, M.R.A. Paternina, "An effective method for impedance estimation in distance relay based on DC offset removal," Proceedings of IEEE PES 2015 General Meeting (GM 2015), 26-30 July, 2015, Denver, Colorado, USA.
- M.R.A. Paternina, A. Zamora, E. Vázquez, J.M. Ramírez, "Phasor estimation under transient conditions," Proceedings of 2015 IEEE PowerTech, Eindhoven, Neatherlands, June 29-July 2, 2015.
- J.M. Ramírez, E. Vázquez, A. Zamora, M.R.A. Paternina, J.A. de la O, "Impedance estimation through the Taylor-Kalman-Fourier filter applied to distance relays," Proceedings of 2014 IEEE PES Transmission & Distribution Conference and Exposition (T&D-LA 2014), Medellin, Colombia - September 10 to 13, 2014.
- E. Vázquez, A. Conde, A. Ramírez, "A New Transformer Differential Protection based on Principal Component Analysis," Proceedings of The IET 12th International Conference on Developments in Power System Protection (DPSP) 2014, 31 March - 3 April 2014 | Tivoli Hotel and Congress Centre, Copenhagen.
- J. Olivares-Galván, E. Vazquez-Martinez, A. Mendieta-Antunez (Mexico), P. Georgilakis (Greece), "Comparison of three-phase distribution transformer banks against three-phase distribution transformers (Paper No. MED10/131), MedPower 2010, 7th Mediterranean Conference and Exhibition on Power Generation, Transmission, Distribution and Energy Conversion, Venue: Adams Hotel, Agia Napa, 7 – 10 November 2010, Agia Napa, Cyprus.

- G. Idárraga Ospina, E. Orduña, E. Vázquez, J. Jager, "Arcing faults characterization using wavelet transform with a special focus on transmission lines auto-reclosure," Proceedings 12a. Iberoamerican Meeting CIGRÉ, Foz do Iguazú-Pr, Brasil, May 20-24, 2007.
- A. Conde, E. Vázquez, "A new algorithm for inverse-time overcurrent relays," Proceedings Andescon 2006, Quito, Ecuador, November 8-10, 2006. (Spanish)
- G. Idárraga, E. Orduña, E. Vázquez, "A New Methodology for Transients Classification and Identification," Proceedings of the 2006 Power System Protection Conference, Bled, Slovenia, September 6-8, 2006.
- E. Vázquez, I. I. Mijares, O. L. Chacón, A. Conde, "Transformer Differential Protection using Principal Component Analysis," 2006 PES General Meeting, Montreal, Canada, June 18-22, 2006.
- Conde, E. Vázquez, "Operation logic proposed for time overcurrent relays," 2006 PES General Meeting, Montreal, Canada, June 18-22, 2006.
- O. Chacón, E. Vázquez, "Power system fault discrimination by iterative adaptive aggregation of support vector machine," International Conference on Computing, Communications and Control Technologies CCCT 2004, Austin, TX, August 14-17, 2004.
- O. Chacón, I. Litvintchev, A. Alvarez, E. Vázquez, "Design of support vector machine by adaptive aggregation," 2003 International Joint Conference on Neural Networks, Portland, Oregon, July 20-24, 2003.
- Ernesto Vázquez, "Application of pattern recognition with principal component analysis for travelling wave protection," Proceedings of the 4th International Conference on Power System Transients, vol. II, Río de Janeiro, Brazil, June 24-28, 2001, pp. 435-440.
- Jorge H. González J, Felipe A. Uribe, J. L. Naredo, Pablo Moreno, Ernesto Vázquez, "Frequency domain transient simulations to assess traveling wave relays," Proceedings of the 32th North American Power Symposium 2000, vol. II, pp. 11-18 to 11-23, University of Waterloo, Waterloo, Canadá, October 23-24, 2000.
- M. Ley, O. L. Chacón, E. Vázquez, "Power system voltage control using a fuzzy logic approach," Proceedings of the 3rd World Multiconference on Systems, Cybernetics and Informatics (SCI'99) and 5th International Conference on Information Systems, Analysis and Synthesis (ISAS'99), Orlando, Florida, USA, July 31 - August 4, 1999.
- E. Vázquez, O. Chacón, H. Altuve, J. Ramírez, "A new power swing blocking principle for distance protection based on neural networks," Proceedings of the IASTED International Conference Artificial Intelligence and Soft Computing, pp. 359-362, May

27-30, 1998, Cancún, México.

- Altuve H., Chacón O., Vázquez E., Posadas D., Sánchez E., "Neural-network-based fault location estimator for transmission line protection," Proceedings of the ISAI/IFIS 1996, México-USA Collaboration in Intelligent Systems Technologies, pp. 186-191, Cancún, Quintana Roo, México, Nov 12-15, 1996.
- Vázquez E., Chacón O., Altuve H., "Neural-network-based fault detector for transmission line protection," Proceedings of the ISAI/IFIS 1996, México-USA Collaboration in Intelligent Systems Technologies, pp. 180-185, Cancún, Quintana Roo, México, Nov 12-15, 1996.
- Vázquez E., Altuve H., Chacón O., "Neural network approach to fault detection in electric power systems," Proceedings of the International Conference on Neural Networks (ICNN'96), vol. 4, pp. 2090-2095, Washington, D.C., U.S.A., June 3-6, 1996.
- Altuve H., Chacón O., Vázquez E., Posadas D., "A neural network approach to fault detection and fault location estimation in electric power systems," Proceedings of the World Automation Congress (WAC'96), Montpellier, France, Mayo 27-30, 1996.
- Vázquez E., Chacón O., Altuve H., "An on-line knowledge-based system for fault section diagnosis in control centers," Proceedings of the 1996 International Conference on Intelligent Systems Applications to Power Systems (ISAP'96), pp. 232-236, Orlando, Florida, U.S.A., Jan 28 - Feb 2, 1996.
- Altuve H., Díaz I., Vázquez E., "Fourier and Walsh digital filtering algorithms for distance protection," Proceedings of the 1995 Power Industrial Computer Applications (PICA'95), pp. 423-428, Salt Lake City, Utah, U.S.A., Mayo 7-12, 1995.
- Vázquez E., Chacón O., Altuve H., "A knowledge-based system for on-line diagnosis of power system fault allocation," Proceedings of the 1994 IEEE International Conference on System, Man and Cybernetics, vol. II, pp. 1148-1153, San Antonio, Texas, U.S.A., Oct 2-5, 1994.
- Vázquez E., Chacón O., Altuve H., "A new method in protection operation analysis for failure place diagnosis in power systems," Proceedings of the North American Power Symposium 1994, Kansas State University, vol. II, pp. 740-746, Kansas, U.S.A., Sep 26-27, 1994.

Books and Book chapters

- Ernesto Vázquez, Héctor Esponda, Manuel A. Andrade, Chapter: A new transformer differential protection algorithm based on data patterns recognition, Springer (Accepted).

- Héctor Esponda, Ernesto Vázquez, Manuel A. Andrade. Book: Transformer differential protection, an algorithm based on modal analysis (In Spanish). Editorial Académica Española, ISBN 978-3-659-70223-5, 2016.
- Ever Benjamín Huerta Leija, Ernesto Vázquez Martínez. Book: Fault location in transmission lines (In Spanish). Editorial Académica Española, ISBN 978-3-659-70201-3, 2016.
- Ernesto Vázquez, Arturo Conde. Book: Power system protection (In Spanish). LAP LAMBERT Academic Publishing GmbH & Co. KG, 2012, ISBN 978-3-8465-7783-7.
- A Conde, E. Vázquez, Design and Application of a Proposed Overcurrent Relay in Radial Distribution Networks (chapter 4), pp. 171-195. Book: Electric Power Systems in Transition, Ed. Olivia E. Robinson, Nova Science Publishers, Inc., 2010, ISBN 978-1-61668-985-8. Available in https://www.novapublishers.com/catalog/product_info.php?products_id=18303.
- Altuve H., Chacón O., Vázquez E., Posadas D., "A neural network approach to fault detection and fault location estimation in electric power systems," Soft Computing with Industrial Applications, volume 5, TSI Press Series, ISBN 1-889335-02-9, pp. 13-18, Albuquerque, 1996. Conference Papers

PATENTS

Conde Arturo and Vázquez Ernesto. Adaptive inverse-time overcurrent relay. Expedient: NL/a/2006/000001. January 10, 2006. No. NL/E/2006/000018.

PROFESSIONAL AFFILIATIONS

IEEE, 1991 - Present
Regular member.

PROFESSIONAL SERVICE

Symposium Organizer

From 2002, Chairman of the Organizing Committee, Ibero American Power System Protection Conference (<http://sipsep.fime.uanl.mx>).

Peer-Reviewed Articles for:

- IEEE Transactions Power Delivery.
- European Transactions on Electrical Power.
- IET Generation, Transmission & Distribution.
- International Journal of Electrical Power and Energy Systems.
- EIC Proceedings, Perú (in Spanish).
- Engineering, UANL proceedings (in Spanish).

LANGUAGES

Spanish: Native Language

English: Intermediate Listener, Speaker, Reading and Writing

COMPUTER SKILLS

Simulation programs:

- EMTP-ATP
- PSCAD-EMTDC
- Aspen (On-Liner, Power-Flow)
- PSS/E
- MATLAB

REFERENCES

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