

Dr. Miguel Vélez-Reyes, P.E.
Professor

Office Address:

Tropical Center for Earth and Space Studies
UPR Mayagüez Campus
P.O. Box 9048
Mayagüez, PR 00681-9042
Tel. (787) 832-2825
FAX (787) 831-2485

e-mail: Miguel.Velez@ece.uprm.edu
m.velez@ieee.org

Research and Teaching Interests:

Parameter estimation and system identification. Model-based signal processing. Algorithms for the solution of inverse problems in remote sensing and for parameter estimation in electrical energy processing systems. Dimensionality reduction in large data sets.

Education:

Massachusetts Institute of Technology, Cambridge, MA, Ph.D. degree in Electrical Engineering and Computer Science, September 1992.

Massachusetts Institute of Technology, Cambridge, MA, Electrical Engineer and S.M.E.E. degrees, May 1988.

University of Puerto Rico Mayagüez Campus, Mayagüez, P.R., B.S.E.E., December 1984.

Experience:

Department of Electrical and Computer Engineering,
University of Puerto Rico Mayagüez Campus,
Professor

Mayagüez, P.R.

July 2000-current

Associate Professor

July 1995-June 2000

Assistant Professor

July 1992-June 1995

Teaching and research in Electrical Engineering. Currently involved in research and teaching graduate and undergraduate courses in estimation, remote sensing, and control systems.

United States Air Force Laboratories, Hanscom Air Force Base, Boston, MA, Summer 2003. Research in Multiplicative Iterative Algorithms for Unmixing of Hyperspectral Imagery.

NASA Goddard Space Flight Center, Greenbelt, MD. Summer 1997. Research in remote sensing data assimilation and information content in high spectral resolution radiometers. Sponsored by NASA-ASEE Summer Faculty Fellowship Program.

United States Air Force Phillips Laboratory, Hanscom Air Force Base, Boston, MA, Summer 1996. Research in algorithms for atmospheric retrieval problems from microwave radiometry using regularization methods.

MTS, Digital Facilities Planning Group, AT&T Bell Laboratories, Ward Hill, MA. Summer 1989. Analysis of transmission and generation of jitter/wander in a communication network using the Synchronous Optical Network (SONET) standard.

Research Assistant, MIT Laboratory for Electromagnetic and Electronic Systems, Cambridge, MA. June-December 1988. Off-line analysis of a state observer for the permanent magnet motor.

MTS, Network Systems Research Department, AT&T Bell Laboratories, Holmdel, NJ. Summer 1986. Built and tested a sensor for ultrasonic imaging using Polaroid's ultrasonic transducer interfaced with an AT&T 6300 personal computer.

MTS, Network Systems Research Department, AT&T Bell Laboratories, Holmdel, NJ. Summer 1985. Designed, built, and tested a prototype memory buffer for a data switch. Work involves digital design and queuing analysis to determine design parameters.

Instructor, Department of Electrical and Computer Engineering, UPR Mayagüez Campus, Mayagüez, P.R. January-May 1985. Taught electronics, measurements, and electric machinery laboratories. Supervised basic measurement and electronic laboratories.

Other Positions Served within UPRM:

Director, Laboratory for Applied Remote Sensing and Image Processing. University of Puerto Rico Mayagüez Campus. July 2003-present.

Director, Tropical Center for Earth and Space Studies. University of Puerto Rico Mayagüez Campus. August 2003-present.

Associate Director, Center for Subsurface Sensing and Imaging Systems. A National Science Foundation Engineering Research Center lead by Northeastern University. July 2003-present.

Coordinator, Graduate Program, Electrical and Computer Engineering Department. President of the ECE graduate committee since 1998.

Campus Coordinator, Center for Power Electronic Systems (CPES). CPES is a NSF Engineering Research Center lead by Virginia Polytechnic Institute. UPRM's campus coordinator since 1998 and center wide education program director from August 2000 to July 2001.

Director, Industrial Affiliates Program, UPRM Electrical and Computer Engineering Department. 1994-2000. Coordination of program activities including company recruiting, promotion, proposal evaluation, and coordination of meetings. During my tenure as director, we increased the number of participating companies from 8 to 11 and the level of funding from \$24,000 to \$55,000 per year. Student participation increased from 20 to 50 students per year.

Coordinator, Energy Conversion Laboratory. Coordination of laboratory courses InEl 4406 and InEl 4086. Coordination of development and maintenance efforts of laboratory facilities in S-103A. Increased number of workstations from 18 to 20 and currently involved in the effort of writing a new lab manual with partial support from the NSF. Awarded a CCLI grant for laboratory enhancement in October 2000. August 1992-May 2001.

Coordinator, Robotics and Automation Laboratory. Coordinator for the ECE Department Robotics and Automation Laboratory in S-102. Coordinate use of lab facilities as part of the course InEl 5516. Also work jointly with the Manufacturing Engineering Education Partnership lead by Penn State in getting equipment donations for over \$400,000 and a technician to support the operation of the Learning Factory of which the Automation and Robotics Labs was a component. August 1994-May 1997.

Consulting Experience:

Preparation of the Puerto Rico Professional Engineer Exam for Electrical Engineering for "Junta Examinadora de Ingenieros, Arquitectos, y Agrimensores" P.R. State Department, March 1997.

Curriculum and Facilities Assessment of the Informatics, and the Technology and Engineering Schools at Universidad Accion Pro Educación y Cultura (UNAPEC), Santo Domingo, Dominican Republic, October 12-16, 1994.

Journal and Magazine Publications:

- M. Hernández-Mora, J.E. González, M. Vélez-Reyes, J.M. Ortiz, Y.P. Pang, and E. Scott, "Dynamic reduced electrothermal model for integrated power electronic modules (IPEM)". **Journal of Electronic Packaging**, In print.
- J.M. Duarte-Carvajalino, M.Vélez-Reyes, S. Tarantola, R. Armstrong, "Sensitivity Analysis of the Water-leaving Remote Sensing Reflectance in Coastal Shallow Waters." Submitted to **Remote Sensing of the Environment**.
- E. O'Neill-Carrillo, M. Vélez-Reyes, and A. Irizarry, "Undergraduate Research Experiences in Power Engineering." In **IEEE Electric Power and Energy Magazine**. July 2003 Special Issue on Education.
- S. Cruz-Pol, Velez-Reyes, M., Hunt, S., Parsiani, H., Colom-Ustaris, J., Jimenez, L.O., and Vasquez, R., "The Laboratory for Applied Remote Sensing and Image Processing at University of Puerto Rico at Mayaguez", **IEEE Geoscience and Remote Sensing Newsletter**, January 2002.
- M. Burth, G.C. Verghese, and M. Vélez-Reyes, "Subset Selection for Improved Parameter Estimation in On-Line Identification of a Synchronous Generator." In **IEEE Transactions on Power Systems**, Vol. 14, No. 1, February 1999.
- B. Argüello-Serrano and M. Vélez-Reyes, "Nonlinear Control of a Heating, Ventilating, and Air Conditioning System with Thermal Load Estimation." In **IEEE Transactions on Control Technology**, Vol. 7, No. 1, January 1999.
- M. Vélez-Reyes and G.C. Verghese, "Parameter Estimation using Decomposed Algorithms with Fast Convergence Rates." In **Computers & Industrial Engineering**, Vol. 33, Nos 1-2, pp. 67-70, 1997.
- M. Vélez-Reyes, "Decomposed Algorithms for Parameter Estimation." In **Zeitschrift für Angewandte Mathematik und Mechanik**. ICIAM/GAMM'95 Issue 3: Applied Stochastics and Optimization, O. Mahrenholtz, K. Marti, and R. Mennicken, eds., Akademie-Verlag, Berlin, pp. 577-578, 1996.
- M. Vélez-Reyes, "A Nonlinear Subset Selection Method for Dynamic System Identification." In **Zeitschrift für Angewandte Mathematik und Mechanik**. ICIAM/GAMM'95 Issue 3: Applied Stochastics and Optimization, O. Mahrenholtz, K. Marti, and R. Mennicken, eds., Akademie-Verlag, Berlin, p575-576, 1996.
- M. Vélez-Reyes and G.C. Verghese, "Developing Reduced Order Electrical Machine Models Using Participation Factors". In R. Vichnevetsky, editor, **IMACS Annals of Computing and Applied Mathematics**, Vol. 3, pp. 797-802, J.C. Baltzer AG Scientific Publishing Company, 1989. Presented at the **12th IMACS World Congress**, July 1988, Paris, France.

Publications in Conference Proceedings:

- M.Vélez-Reyes and S. Rosario, "Solving Abundance Estimation in Hyperspectral Unmixing as a Least Distance Problem." To appear in **Proceedings IEEE International Geosciences and Remote Sensing Symposium**, Alaska, 2004.
- E. Arzuaga-Cruz¹, L.O. Jimenez-Rodriguez, M. Velez-Reyes, D. Kaeli, E. Rodriguez-Diaz, H.T. Velazquez-Santana, A. Castrodad-Carrau, L.E. Santos-Campis, and C. Santiago. "A MATLAB Toolbox for Hyperspectral Image Analysis." To appear in **Proceedings IEEE International Geosciences and Remote Sensing Symposium**, Alaska, 2004.
- J.M. Ortiz-Rodríguez, A.R. Hefner, M. Vélez-Reyes, M. Hernández-Mora, J. González, J.Z. Chen, Y.F. Pang, D. Boroyevich, "Lumped-Parameter Thermal Modeling of an IPEM using Thermal Component Models." To appear in **Proceedings IEEE Workshop on Computer Applications in Power Electronics**, August 2004.
- S. Morillo-Contreras, M. Vélez-Reyes, S.D. Hunt, "Effects of Resolution Enhancement and Atmospheric Correction Pre-Processing in Classification of Hyperspectral Imager." In **Algorithms and Technologies**

- for **Multispectral, Hyperspectral, and Ultraspectral Imagery X**, Proceedings of SPIE Vol. 5425, April 2004.
- M. Hernández-Mora, J.E. González, and M. Vélez-Reyes, “Dynamic reduced electrothermal model for integrated power electronic modules (IPEM): Part I-Thermal analysis”. In **Proceedings of the ASME International Mechanical Engineering Congress**, Washington, DC, November 16 - 21, 2003.
- Y. Báez and M. Vélez-Reyes, “Two-Stage Identification of Motor Drives using Gray Box Models.” In **Proceedings of the North American Power Symposium**, Rolla, MO, October 21-22, 2003.
- B. Rodríguez-Medina, L. Orama, and M. Vélez-Reyes, “Arc Model Parameter Extraction Techniques using Nonlinear Least Squares.” In **Proceedings of the North American Power Symposium**, Rolla, MO, October 21-22, 2003.
- J. Duarte, M. Vélez-Reyes, Stefano Tarantola, Fernando Gilbes, and Roy Armstrong, “A probabilistic sensitivity analysis of water-leaving radiance to water constituents in coastal shallow waters.” In **Ocean Remote Sensing and Imaging**, Proceedings of SPIE Vol. 5155, August 2003.
- Y. Masalmah and M. Vélez-Reyes, “Clutter Modeling Modeling for Subsurface Detection in Hyperspectral Imagery using Markov Random Fields”. In **Imaging Spectrometry X**, Proceedings of SPIE Vol. 5159, August 2003.
- A. Umana and M. Vélez-Reyes, “Determining the dimensionality of hyperspectral imagery for unsupervised band selection.” In **Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery IX**, Proceedings of SPIE Vol. 5093, April 2003.
- M. Velez-Reyes, S. Rosario, A. Puetz, R. B. Lockwood, “Iterative algorithms for unmixing of hyperspectral imagery.” In **Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery IX**, Proceedings of SPIE Vol. 5093, April 2003.
- E. Arzuaga-Cruz, L. O. Jimenez-Rodriguez, M. Velez-Reyes, “Feature extraction and band subset selection techniques based on relative entropy criteria for hyperspectral data analysis.” In **Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery IX**, Proceedings of SPIE Vol. 5093, April 2003.
- E. Rodriguez-Diaz, L. O. Jimenez-Rodriguez, M. Velez-Reyes, “Subsurface detection of coral reefs in shallow waters using hyperspectral data.” In **Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery IX**, Proceedings of SPIE Vol. 5093, April 2003.
- M. Vélez-Reyes, R. Rivera, and Y. Báez, “Gray-Box Modeling of Mechanical Loads for Electric Drive Systems using Neural Networks.” In **Proceedings Latin-American Congress on Automatic Control (CLCA 2002)**, Guadalajara, Mexico, December 2002.
- J. Rodríguez, Z. Parrilla, M. Veléz-Reyes, University of Puerto Rico at Mayagüez, PR; A. Hefner, D. Berning, National Institute of Standards and Technology, USA; J. Reichl, J. Lai, Virginia Polytechnic Institute and State University, “Thermal Component Models for Electro Thermal Analysis of Multichip Power Modules.” In **Proceedings of the IEEE/IAS Annual Meeting**, October 2002.
- L. Jáuregui and M. Vélez-Reyes, “Conditioning Analysis of Parameter Estimation in a Synchronous Generator.” In **Proceedings of the 34th Annual North American Power Symposium**, October 14-15, 2002.
- L. O. Jiménez-Rodriguez, E. Rodriguez-Diaz, M. Velez-Reyes, F. Gilbes, C. A. DiMarzio, “Automatic coral reef detection by the application of Tikhonov regularization to inverse modeling in hyperspectral images.” In **Ocean Remote Sensing and Applications**, Proceedings of SPIE Vol. 4892, October 2002.
- L. O. Jimenez-Rodriguez, M. Velez-Reyes, E. Arzuaga, “Unsupervised feature extraction techniques for hyperspectral data and its effects on unsupervised classification.” In **Image and Signal Processing for Remote Sensing VIII**, Proceedings of SPIE Vol. 4885, September 2002.

- M. Velez-Reyes and J.C. Tafur, "An Adaptive Feedback Linearizing Controller for a Shunt DC Motor." In **Proceedings IEEE Workshop on Computer Applications in Power Electronics**, June 2002.
- E. Tranter and M. Vélez-Reyes, "Distance Learning Programs at the Center for Power Electronics Systems." In **Proceedings IEEE Workshop on Computer Applications in Power Electronics**, June 2002.
- Z. Parrilla, J.J. Rodríguez, A. Hefner and M. Vélez-Reyes, "A Computer-Based Testbed for Validation of Electrothermal Models for Power Electronic Modules." In **Proceedings IEEE Workshop on Computer Applications in Power Electronics**, June 2002.
- M. Velez-Reyes, D.M. Linares, L.O. Jimenez-Rodriguez, "Two-stage band selection algorithm for hyperspectral imagery." In **Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery VIII**, Proceedings of SPIE Vol. 4725, April 2002.
- M. Vélez-Reyes, W.L. Fung, and J.E. Ramos-Torres, "Developing Robust Algorithms for Speed and Parameter Estimation in Induction Machines." In **Proceedings of the IEEE Conference on Decision and Control**, 3-7 December 2001, Orlando, Florida.
- V. Petrovic, A. M. Stankovic, and M. Velez-Reyes, "Sensitivity analysis of injection--based position estimation in PM synchronous motors." In **Proceedings of the 4th IEEE International Conference on Power Electronics and Drive Systems**, 22-25 October 2001, Bali.
- E. O'Neill-Carrillo, A. Irizarry-Rivera, M. Velez-Reyes "Curriculum Improvements in Power Engineering." In **Proceedings of Frontiers in Education (FIE 2001)**, October 10-12, 2001, Reno Nevada.
- M. Velez-Reyes and D.M. Linares, "Comparison of Principal-Component-Based Band Selection Methods for Hyperspectral Imagery." In **Image and Signal Processing for Remote Sensing VII**, Proceedings of SPIE, Vol. 4541, September 2001.
- L.O. Jiménez-Rodríguez, M. Vélez-Reyes, J. Rivera-Medina, and H. Velásquez, "Unsupervised Decision Fusion for Hyperspectral Data." In **Image and Signal Processing for Remote Sensing VII**, Proceedings of SPIE, Vol. 4541, September 2001.
- R. Rivera and M. Vélez-Reyes, "Gray-Box Modeling of Electric Drive Systems using Neural Networks." In **Proceedings of the IEEE Conference on Control Applications**, September 5-7, 2001, Mexico.
- C. Rentel-Gómez and M. Vélez-Reyes, "Decoupled Control of Temperature and Relative Humidity using a Variable-Air-Volume HVAC System and Non-interacting Control." In **Proceedings of the IEEE Conference on Control Applications**, September 5-7, 2001, Mexico.
- L. Jáuregui and M. Vélez-Reyes, "Conditioning Analysis of Parameter Estimation in a Synchronous Generator." In **Proceedings of the IEEE International Electric Machines and Drives Conference**, Cambridge, MA, June 2001.
- J. Ramos and M. Vélez-Reyes, "Comparison of Parameter Conditioning in Output Error and Equation Error Approaches for Speed and Parameter Estimation in Induction Machines". In **Proceedings of the IEEE International Electric Machines and Drives Conference**, Cambridge, MA, June 2001.
- S. D. Hunt and M. Velez-Reyes, "Band selection for lossless image compression." In S.S. Shen and M.R. Descour, editors, **Algorithms for Multispectral, Hyperspectral, and Ultraspectral Imagery VII**, Proceedings of SPIE Vol. 4381, April 2001.
- M. Vélez-Reyes and E. Tranter, "Center for Power Electronic Systems: Education and Outreach Programs." In Proceedings of **E=TeM2 – International Conference of the use of Information Technology in Power Engineering Education**. Sponsored by EPE, Brussels, Belgium, March 2001.
- E. Rodriguez-Diaz, M. Velez-Reyes, Univ. of Puerto Rico/Mayaguez, R. K. Chin, C. A. DiMarzio, Northeastern Univ., "Wavelength selection for imaging hemoglobin in skin." In **Subsurface Sensing Technologies and Applications II**, Proceedings of SPIE, Vol. 4129, San Diego California, July 2000.

M. Vélez-Reyes, L.O. Jiménez, D.M. Linares, and H.T. Velazquez, "Comparison of matrix factorization algorithms for band selection in hyperspectral imagery." In **Algorithms for Multispectral, Hyperspectral and Ultraspectral Imagery VI**, Proceedings of SPIE, Vol. 4049, Orlando Florida, April 2000.

M. Vélez-Reyes, M. Pérez-Quñones, and J.L. Cruz-Rivera, "The Industrial Affiliates Program at the University of Puerto Rico Mayagüez." In **Proceedings of Frontier in Education Conference**, in San Juan, P.R, November 10-13, 1999.

L. O. Jiménez, M. Velez-Reyes, Y. Chaar, F. Fontan, and C. Santiago, "Partially Supervised Detection Using Band Subset Selection in Hyperspectral Data." In **Algorithms for Multispectral and Hyperspectral Imagery V**, Proceedings of SPIE, Vol. 3717, Orlando Florida, April 1999.

F. González and M.Vélez-Reyes, "Algorithms for Nonlinear Retrieval Problems in Atmospheric Remote Sensing using Regularization Methods." In **Proceedings of the Conference on Remote Sensing of Clouds and Atmosphere II**, EUROPTO Series Vol. 3495, 1998.

M. Vélez-Reyes and R. Castro Anaya, "Sensitivity and Conditioning Issues in Speed Sensorless Control of Induction Motors." In **Proceedings of the IEEE Industry Applications Society Annual Meeting**, St. Louis. MO., October 12-16, 1998.

W. Johnson, L. Morell, R. Vásquez, R. Fernández, M. Vélez-Reyes, J.L. Zayas-Castro, and J. Bujosa, "Industry-Academia Partnership: A Success Story of the University of Puerto Rico at Mayagüez and Raytheon Corporation." In **Proceedings of the International Conference on Engineering Education**, Rio de Janeiro, Brazil, August 1998.

M. Vélez-Reyes, "Atmospheric Retrievals using Regularization Methods." In **Proceedings IEEE International Geosciences and Remote Sensing Symposium**, July 6-10, Seattle, WA, 1998.

M. Vélez-Reyes and L. O. Jiménez, "Subset Selection Analysis for the Reduction of Hyperspectral Imagery." In **Proceedings IEEE International Geosciences and Remote Sensing Symposium**, July 6-10, Seattle, WA, 1998.

M. Vélez-Reyes and J. Joiner, "Analysis of Information Content in High Resolution Sounders using Subset Selection Methods." In **Proceedings of the 1998 NASA URC Technical Conference on Aeronautics, Space Science and Technology, Earth System Sciences, Global Hydrology, and Education**. Held in Huntsville AL during February 22-26, 1998.

F. Pagán, G. Fernández, M. Vélez-Reyes, and L. O. Jiménez, "Dimension Reduction in AVIRIS and LANDSAT Images using Subset Selection Methods." In **Proceedings of the 1998 NASA URC Technical Conference on Aeronautics, Space Science and Technology, Earth System Sciences, Global Hydrology, and Education**. Held in Huntsville AL during February 22-26, 1998.

M. Vélez-Reyes, L. O. Jiménez, F. Pagán, and G. Fernández, "Subset Selection for the Analysis of Hyperspectral Data." In **Proceedings of the 1997 International Symposium on Spectral Sensing**. Held in San Diego CA during December 13 to 19, 1997.

M. Vélez-Reyes and R. Galarza-Galarza, "Regularization of Atmospheric Temperature Retrieval Problems." In M. Jamshidi, et.al. editors, **NASA University Research Centers Technical Advances in Education, Aeronautics, Space, Autonomy, Earth and Environment**, NASA ACE Center Series, Vol. 1, 1997.

F.O. Gonzalez and M.Vélez-Reyes, "Atmospheric Correction of Satellite Imagery using Modtran 3.5 Code." In M. Jamshidi, et.al. editors, **NASA University Research Centers Technical Advances in Education, Aeronautics, Space, Autonomy, Earth and Environment**, NASA ACE Center Series, Vol. 1, 1997.

M. Vélez-Reyes and G.C. Verghese, "Subset Selection in Identification, and Application to Speed and Parameter Estimation for Induction Machines", In **Proceedings of the 4th IEEE Conference on Control Applications**, Albany NY, September 28-29, 1995.

B. Argüello and M. Vélez-Reyes, "Nonlinear Control of a HVAC System with Thermal Load Estimation." In **Proceedings of the 4th IEEE Conference on Control Applications**, Albany NY, September 28-29, 1995.

G. Beauchamp and M. Vélez-Reyes, "A Process Instrumentation and Control Laboratory", In **Proceedings of the 1995 ASEE Annual Conference**, Vol. 1, pp. 675-679, Anaheim, CA, June 1995.

M. Vélez-Reyes and G.C. Verghese, "Robust Decomposed Algorithms for Speed and Parameter Estimation for Induction Machines". In **Proceedings of the IMACS-TC1 4th International Conference on Computational Aspects of Electromechanical Energy Converters**, Montreal, Canada, July 1993.

M. Vélez-Reyes and G.C. Verghese, "Decomposed Algorithms for Speed and Parameter Estimation for Induction Machines". In **Nonlinear Control Systems Design 1992**, Selected papers from the 2nd IFAC Symp., Bordeaux, France, 24-26 June 1992, Edited by M. Fliess, IFAC Symposium Series No. 7, Pergamon Press, 1993.

K. Minami, M. Vélez-Reyes, D. Elten, G.C. Verghese, and D. Filbert. "Multi-stage Speed and Parameter Estimation for Induction Machines". In **Proceedings of the IEEE Power Electronics Specialist Conference**, Boston, MA, June 1991.

M. Vélez-Reyes, K. Minami, and G.C. Verghese, "Recursive Speed and Parameter Estimation for Induction Machines". In **Proceedings of the IEEE Industry Applications Society Annual Meeting**, San Diego, CA, October 1989.

Presentations:

M. Vélez-Reyes, "PECASE at a Non-PhD Granting Institution." **NSF CAREER Mentoring and Networking Workshop**, National Science Foundation, Arlington, VA, January 21-23, 2004.

M. Vélez-Reyes, "Feature Subset Selection in Large Data Sets using Matrix Factorizations with Application to HSI Band Subset Selection." **Center for Spatial Technologies and Remote Sensing**, University of California at Davis, December 2003.

M. Vélez-Reyes, "Tropical Center for Earth and Space Studies: A NASA University Research Center." **Puerto Rico Space Grant Consortium Second Congress on Integrating NASA Research and Education Projects in Puerto Rico**, Wyndham Condado Plaza Hotel, San Juan, November 19 - 21, 2003.

M. Vélez-Reyes, "NSF Center for Subsurface Sensing and Imaging," **Industry-University Symposium on Electrical Engineering (IUSEE)**, Colegio de Ingenieros y Agrimensores de Puerto Rico, San Juan PR., November 14, 2003.

M. Vélez-Reyes and A. Stankovic, "Challenges in Modeling and Identification of Power Systems: Dealing with Ill Conditioning, High Dimensionality, and other Challenges." **NSF Workshop on Applied Mathematics for Deregulated Electric Power Systems: Optimization, Control, and Computational Intelligence**, Doubletree Hotel Crystal City-National Airport, Alexandria, VA, November 3-4, 2003

E. Arzuaga-Cruz, L.O. Jimenez-Rodriguez, D. Kaeli, M. Velez-Reyes, E. Rodriguez-Diaz, L.E. Santos-Campis, and C. Santiago, "A MATLAB Toolbox for Hyperspectral Image Analysis." Presented at the **IEEE Workshop on Advances in Techniques for Analysis of Remotely Sensed Data**, NASA Goddard Visitor Center, Washington DC, USA October 27/28, 2003.

M. Vélez-Reyes and S. Hunt, "Hyperspectral Image Processing Research at CenSSIS UPRM." **National Imagery and Mapping Agency**, Virginia, August 21, 2003.

M. Vélez-Reyes, E. Tranter, E. O'Neill-Carrillo, "CPES Education Program and its Impact in UPRM." **First Caribbean Congress on Power Quality**, Hyatt Dorado Beach Dorado, Puerto Rico, June 24-27, 2003.

M. Velez-Reyes, L.O. Jimenez, E. Arzuaga, A. Umaña, and D. Linares, “An unsupervised band subset selection algorithm for hyperspectral images using matrix factorizations.” **2003 AVIRIS Workshop**, Pasadena CA, February 2003.

M. Vélez-Reyes. “Unsupervised Feature Subset Selection using Matrix Factorization Methods with Application to Hyperspectral Imagery Band Subset Selection.” **PRECISE & Doctoral Program in CISE Computing and Information Sciences and Engineering Technical Lecture Series**. January 30, 2003.

M. Vélez-Reyes. “Feature Subset Selection in Large Spaces using Vector Space Methods and their Application to Hyperspectral Band Subset Selection.” Presented at **Signal and Imaging Sciences Workshop at Lawrence Livermore National Laboratory**, November 14-15, 2002.

A. Umaña and M. Vélez-Reyes, “Determining the Dimensionality of Hyperspectral Imagery.” In **Proceedings of the 1st Electrotechnology International Symposium**, San Juan, PR, November 2002.

M. Vélez-Reyes and D. Borojevic. “Integrated Modeling for Power Electronics Packaging.” Presented at **Modern Trends in Electronic Packaging**, University of Puerto Rico Mayagüez Campus, Jan. 31-Feb. 1, 2001.

M. Velez-Reyes, “Band Selection Methods for Hyperspectral Image Processing using Matrix Factorization Methods.” Presented in **Center for Subsurface Sensing and Imaging Systems Research and Industrial Collaboration Conference**, in Boston, MA on November 13-15, 2000.

M. Velez-Reyes, “Inverse Problems in Hyperspectral Image Processing.” Presented in **Center for Subsurface Sensing and Imaging Systems Research and Industrial Collaboration Conference**, in Boston, MA on November 13-15, 2000.

M. Vélez-Reyes. “Parameter Estimation for Ill-Conditioned Systems.” Presented at **United Technologies Research Center**, in Hartford, Connecticut, on February 18, 2000.

M. Vélez-Reyes. “Parameter Estimation for Ill-Conditioned Systems.” Presented at **Otis Elevators Drives Research Center**, in Fairmont, Connecticut, on February 17, 2000.

M. Vélez-Reyes. “Center for Power Electronic Systems.” Presented at **Eaton Corporation Innovation Center**, in Milwaukee, Wisconsin, on November, 1999.

M. Vélez-Reyes and L. Jimenez, “Using Subset Selection Methods for Hyperspectral Image Processing.” Presented at the **4th International Congress on Industrial and Applied Mathematics (ICIAM 99)** held at the University of Edinburgh in Edinburgh Scotland, in July 4-10, 1999.

M. Vélez-Reyes and Rogelio Castro-Anaya, “Speed and Parameter Estimation for Induction Machines using Decomposed Algorithms.” Presented at “**Congreso de Ingeniería, Agrimensura y Ramas Afines del 1998 (COINAR '98)**,” held at Interamerican University Bayamón Campus, March 1998.

J.M. Ortiz-Rodríguez and M. Vélez-Reyes, “A MATLAB GUI Environment to Aid in the Detection of Oceanic Features Present in AVHRR Thermal Imagery.” In **1998 NASA URC Technical Conference on Aeronautics, Space Science and Technology, Earth System Sciences, Global Hydrology, and Education**. Held in Huntsville AL during February 22-26, 1998.

M. Vélez-Reyes, “Industry Affiliates Program & Raytheon Partnership.” Presented during the panel **A Decade of Partnership: University of Puerto Rico Mayagüez and Raytheon** at the **Society of Hispanic and Professional Engineers 20th Annual National Technical and Career Conference**, February 4-7, Orlando FL, 1998.

M. Vélez-Reyes, “Power Engineering Education at the University of Puerto Rico Mayagüez Campus.” Presented at **NSF Workshop on Innovative Power Engineering Education**, October 30 to November 1, Arlington VA, 1997.

M. Vélez-Reyes, "Parameter Estimation for Ill-Conditioned Systems with Applications to Electric Drives and Power Systems" Presented at **NSF Workshop on Innovative Power Engineering Education**, October 30 to November 1, Arlington VA, 1997.

C.H. Rentel-Gómez and M. Vélez-Reyes, "Nonlinear Decoupling of Temperature and Relative Humidity for an Air Conditioning System." Presented at "**Congreso de Ingeniería, Agrimensura y Ramas Afines de 1997 (COINAR '97)**," held at Turabo University, P.R. on April 1997.

M. Vélez-Reyes, "Atmospheric temperature retrievals using Hansen's regularization method for linear discrete inverse problems." Presented at **XVII Symposium on Caribbean Geology: Remote Sensing**, February 1997

M. Vélez-Reyes, "An Overview on SMT and Manufacturing Activities at UPRM," Presented in the panel **Academia in SMT Science and Technology** as part of the **First Conference in Surface Mount Technology**, Universidad Politécnica de Puerto Rico, November 22, 1996.

J. Tafur-Sotelo and M. Vélez-Reyes, "Adaptive Feedback Linearizing Controller for a Shunt DC Motor." In **Simposio IEEE Mexico**, Monterrey, Mexico, October 23-25, 1996.

S. Seguí and M. Vélez-Reyes, "Adaptive Speed Control of a DC Motor without a Speed Transducer." Presented at **The 15th Panamerican Congress of Mechanical, Electrical and Allied Engineering**, Panama City, Panama, October 1995.

M. Vélez-Reyes, "Decomposed Algorithms for Parameter Estimation," Presented at **The International Congress on Industrial and Applied Mathematics (ICIAM 95)**, Hamburg, Germany, July 3-7, 1995.

M. Vélez-Reyes, "A Nonlinear Subset Selection Method for Dynamic System Identification," Presented at **The International Congress on Industrial and Applied Mathematics (ICIAM 95)**, Hamburg, Germany, July 3-7, 1995.

M. Vélez-Reyes, "Nonlinear Control of a Variable Air Volume Air Conditioning System with Cooling Load Estimation." Presented at **7th Puerto Rico EPSCoR Annual Conference**, Dorado, Puerto Rico, April 1995.

B. Argüello and M. Vélez-Reyes, "Intelligent Energy Management Systems for Commercial and Industrial Buildings", Presentation at the **Symposium on Alternative Energy Sources for Puerto Rico and the Caribbean**. Sponsored by UPR Mayagüez Campus, Sandia National Laboratories, and Oak Ridge. UPR Mayagüez Campus, Mayagüez, Puerto Rico, December 15-16, 1994.

M. Vélez-Reyes, "A Method for Subset Selection in Nonlinear Regression Problems for Dynamic System Identification", Presented at the **UPR Medical Sciences Campus 15th Annual Research Forum**, March 1994, San Juan, Puerto Rico. Abstract in the **Puerto Rico Health Sciences Journal**.

M. Vélez-Reyes and R. Vásquez-Espinosa, "The Laboratory for Applied Remote Sensing and Image Processing at the University of Puerto Rico-Mayaguez (in spanish)". In **Proceedings of "La Teledetección por Radar en América Central y el Caribe"**, Sponsored by "Proyecto RADAR Costa Rica Canada", San José, Costa Rica, November 1993.

M. Vélez-Reyes, "Numerical and Sensitivity Issues in Parameter Estimation for Dynamic Systems", Presented at **CIAPR 5th Congress in Engineering and Land Surveying**, San Juan, Puerto Rico, April 1993.

Research Grants:

Co-PI in **Failure Probabilities for Risk-Based Maintenance and Parameter Estimation of Synchronous Machines**, National Science Foundation, \$99,444.

Co-PI in **Intelligent Power Routers for Distributed Coordination in Electric Energy Processing Networks**, ONR/NSF Partnership in Electric Power Networks Efficiency and Security (EPNES) Program, October 1, 2002 to August 31, 2005, \$499,849.

Co-PI in **Acquisition of Instrumentation for the Electric Energy Processing Systems Laboratory at UPRM**, (Dr. Efrain O'Neill, PI) National Science Foundation Major Research Instrumentation Program, January 1, 2002 to December 2003, \$180,000.

Co-PI in **Integrating Laboratory Practices and Undergraduate Research to the Power Engineering Curriculum** (Dr. Efrain O'Neill, PI) NSF CCLI Program, \$160,000, May 1, 2001 to April 2003.

Project Director (since August 2003), **Tropical Center for Earth and Space Studies** and PI for the **Information Processing and Extraction Group**, NASA University Research Centers Program, October 2000 to September 2005. \$8.5M.

Co-PI in **Center for Subsurface Sensing and Imaging Systems**. A consortium between Northeastern University (lead institution), Boston University, Rensselaer Polytechnic Institute, and the University of Puerto Rico Mayagüez Campus. NSF Engineering Research Centers Program. August 2000 to July 2005. UPRM Component \$3.75M

PI in **PECASE: Parameter Estimation for Ill-Conditioned Systems with Application to Electric Drives and Power Systems**. NSF PECASE Program. 1 June 1997 to 31 May de 2002. Amount: from NSF \$500,000, UPR Matching \$177,500.

UPRM Project Director in **Center for Power Electronic Systems**. A consortium between Virginia Institute of Technology and State University (Lead Institution), University of Wisconsin, Rensselaer Polytechnic Institute, North Carolina A&T, and the University of Puerto Rico Mayagüez Campus. NSF Engineering Research Centers Program. August 1998 to July 2003. UPRM Component \$1.0M

Co-PI in **Unsupervised Classification System for Hyperspectral Data Analysis** (Dr. Luis Jiménez, PI). DEPSCoR. \$330,000 October 1997 to September 2000.

Co-PI in **Clustering and Subset Selection Research for Hyperspectral Data Analysis** (Dr. Luis Jiménez, PI). ARMY Corp of Engineers Topographic Engineering Center. \$314,862 October 1997 to September 2000.

Co-PI in **Integrated Atmospheric Water Estimation using Global Positioning System (GPS) Sounding and Satellite Water Vapor Retrieval Algorithms** in the grant **Tropical Atmospheric Science Center**. (Dr. Glen Mattioli, PI) NASA EPSCoR June 1 1997 to May 31, 1999. Amount for the component: \$160,000. Total grant amount \$2M (\$1M NASA, and \$1M UPR).

PI in **Development of Algorithms for Linear and Nonlinear Retrieval Problems in Atmospheric Remote Sensing using Regularization Methods**. Air Force Office of Scientific Research Summer Research Extension Program. February 1 to December 1997. Amount: \$25,000. Matching from UPRM \$14,386.

PI for the **Advanced Automated Image Analysis Project** in the grant **Tropical Center for Earth and Space Studies**, with Prof. Rafael Fernández-Seín (Project director), NASA University Research Centers Program, \$6.5M, July 1995 to June 2000.

Co-PI in **The Manufacturing Engineering Education Partnership**, (Dr. J.L. Zayas PI), ARPA Technology Reinvestment Program, \$659,000, October 1993 to May 1995.

Co-PI in **Integrated Flash Flood Forecasting Model**, (Prof. Rafael Fernández Seín PI), MRCE National Science Foundation, Washington, DC, \$186,868, October 1993 to September 1995.

PI. in **Intelligent Energy Management Systems for Industrial and Commercial Buildings in Puerto Rico**, (Dr. David Serrano (Co-PI.) and Dr. Arshad Khan (Co-PI)), INDUNIV Research Center, San Juan, PR, \$32,520.00, July 1993 to June 1994.

PI in **Energy Management Systems for Commercial and Industrial Buildings**, Research Initiation Grant from P.R. EPSCoR Program, \$4,000.00, June-July 1993.

Contracts:

PI in **Iterative Algorithms for Unmixing of Hyperspectral Imagery**, Air Force Research Laboratories, November 1, 2002 – May 31, 2003, \$10,000.

Co-PI in **Output Selection for Tuning of Field Oriented Controllers**. Subcontract to Northeastern University. Sponsor: General Motors Company Advanced Vehicles Division. August 2001 to May 2002, \$11,581.

PI in **A Study of Satellite Monitoring of Gas Emissions for Earthquake Prediction**. Subcontract to Northeastern University. Sponsoring Agency: National Reconnaissance Office, February-December 2000. \$35,000.

Co-PI in **Redesign of the Timing Output T1 Assembly: Conversion to Surface Mount Technology**, Telecom Solutions, Puerto Rico, Inc. \$56,702.60, April-December 1997.

Co-PI en **Redesign of the MICRO-400 Line Driver: Transition from Through-Hole to SMT**, PRIME Fomento, \$10,456, July-December 1995.

Courses Taught (Last 5 years):

Estimation, Detection, and Stochastic Processes (Created). Fundamentals of detection, estimation, and random process theory for signal processing, communications, and control. Random processes and sequences. Linear systems driven by random processes. Bayesian and nonrandom parameter estimation. Signal detection and estimation from waveform observations. Wiener and Kalman filters.

System Identification (Created). Introduction to the techniques for obtaining mathematical models of dynamic systems from observations of their behavior. Parametric and non-parametric identification. Development of parametric model structures from physical, black-box, and semi-physical principles. Fundamental issues in parameter identifiability and model complexity. Parameter estimation. Experimental design. Model validation.

Introduction to Nonlinear Control Systems (Revised): Analysis and synthesis of nonlinear control systems; phase and describing function techniques; Lyapunov's first and second methods and its applications in the design and stability determination of nonlinear systems; introduction to several nonlinear control methodologies.

Electric Motors Control (Revised): Characteristics and selection criteria of alternating current (AC) and direct current (DC) motors; design and control of solid state drive systems; braking methods; heating and duty cycle calculations. Performance calculations and design of closed loop controllers.

Introduction to Control Systems: Analysis of control system and their mathematical modeling; analysis and design of control systems for single-input single-output plants.

Graduate Theses Supervised:

Shirley Morrillo, **Design and Implementation of a Hyperspectral Image Analysis Toolbox in C++**, Master Thesis, In Progress.

Jose M. Ortiz, **Electrothermal Modeling of IPEM Generation IIC**, Masters Thesis, In Progress.

Yamilka Baez, **Gray Box Modeling of Electric Drives**, Masters Thesis, In Progress.

Samuel Rosario, **Iterative Algorithms for Unmixing of Hyperspectral Imagery**, Masters Thesis, In Progress.

Michelle Barreto, **Estimation of water inherent optical properties using hyperspectral imagery**, Masters Project, In Progress.

José J. Rodríguez, **Electrothermal Simulation of Integrated Power Electronic Modules**, Master Thesis, In Progress.

Julio M. Duarte, **Sensitivity analysis of the effect of the water column on remote sensing reflectance in shallow waters case**, Masters Thesis, June 2003.

Alejandra Umaña, **Determining the dimensionality of hyperspectral images**, Master Thesis, June 2003.

Yahya Masalmah, **Statistical Modeling of Clutter in Hyperspectral Data using Gauss-Markov Random Fields**, Master Thesis, June 2002.

Roberto Rivera Sampayo, **Gray-box Modeling of Electrical Machinery**, Master Thesis, December 2001.

Wee Liam Fung Ng, **Implementation of a Sensorless Induction Motor Drive**. Master Thesis, December 2001.

Lida Jauregui, **Overcomming Ill-Conditioning in Parameter Estimation with Application to Synchronous Generator**. Master Thesis, July 2001.

José Ramos, **Sensitivity Analysis of Speed and Parameter Estimation for Induction Motors**, Master Thesis, May 2001.

Milagros Linares, **Subset Selection for the Reduction of Hyperspectral Imagery**. Master Thesis, May 2001.

Miguel Lacouture, **Implementation of Algorithms for Subset Selection in Hyperspectral Imagery**. Master of Engineering Project, December 2000.

Edgardo Desardén, **Control of a Centrifuge Machine**, Master of Engineering Project, July 1998.

Fabian González, **Algorithms for Atmospheric Retrievals using Regularization Methods**, Master Thesis, May 1998.

Jose M. Ortiz, **Detection of Oceanic Features in Thermal Imagery**, Master Thesis, May 1998.

José L. Rodríguez-Granell, **Detection of Data Breaks using Nonlinear Smoothing Algorithms**, Master of Engineering Project, May 1998.

Rogelio Castro, **Adaptive Speed Control of an Induction Motor without a Speed Sensor**, Master Thesis, May 1997.

Carlos Rentel, **Nonlinear Decoupling of Temperature and Relative Humidity for a Heating Ventilating and Air Conditioning System**, Master Thesis, December 1996.

Elvyn Rodríguez, **Decoupled Control of a Separately Excited DC Motor**, Master Thesis, May 1996.

Julio Tafur, **Adaptive Output Feedback Linearizing Speed Control of a Shunt DC Motor**, Master Thesis, December 1995.

Betzaida Argüello, **Nonlinear Control of a HVAC System with Thermal Load Estimation**, Master Thesis, December 1994.

Samuel X. Seguí, **Adaptive Speed Control of a DC Motor without Rotational Transducers**, Master Thesis, May 1994.

Undergraduate Students Supervised:

Carlos Alicea, **Implementation of an electrothermal model for the IPEM Generation IIC in SABER**, August-December 2002.

Zharadeen Parrilla, **A Computer-based testbed for calibration and validation of power electronic modules**, August 2001 – May 2002.

James Betancourt, **Electrothermal Modeling of Integrated Power Electronic Modules**, January-May 2001.

Isabel Rodríguez and Yamilka Báez, **Self-Commissioning of a DC Drive System**, January 2000-May 2001.

Ileana Carrasquillo y Leila Rodríguez, **Atmospheric Correction of Hyperspectral Imagery**, January 2000-May 2001.

Magda Hernández, Omar Robles, and Joari R. Rivera Rodriguez, **Improvements to the Sea Surface Temperature Environment**, August-December 1998.

Francisco Pagán, **Subset Selection Analysis of AVIRIS Imagery**, January 1997-May 1998.

Gianna Fernández, **Subset Selection Analysis of LANDSAT Imagery**, January-May, 1997.

Rachel Vélez, **Development of a Web Page for TCESS Advanced Automated Image Analysis Project**, January-May, 1997.

Ruben E. Galarza-Galarza, **Atmospheric Temperature Retrievals from Microwave Radiometry**, August-December 1996.

Juan Laguer-Díaz, **Atmospheric Correction of Satellite Imagery**, August-December 1996.

Ruben E. Galarza-Galarza, **Edge Detection in Ocean Imagery**. January-May 1996.

Gricelis Zayas-Cedeño and Michelle Cintrón-Torres, **Algorithms for Signal and Image Reconstruction**. August 1995-May 1996.

Juan Laguer-Díaz, **Signal Processing Applications in Flood Forecasting**. August 1995-May 1996.

José D. Fernández, Orlando M. Cáceres, and Adnorin L. Méndez, **Design and Implementation of a Graphic User Interface for Programming and Control of Robots**. January-May 1996.

Ismael García-Rios, **Speed Control of a DC Motor without a Speed Sensor**. August 1994-May 1995.

José A. Valentín, **Data Acquisition System for Flash Flood Forecasting**, August 1994-May 1995.

Honors and Awards:

Presidential Early Career Award for Scientists and Engineers for “Contributions to engineering education and research on power systems applicable to large systems that transfer power among multiple suppliers in the electric power industry.” The presidential honor is the highest bestowed by the U.S. government on outstanding young scientists and engineers who are in the early stages of their independent research careers. Given in November 3, 1997.

Who's Who in Engineering Education (WWEE), 2002 edition

Senior Member of the Institute of Electrical and Electronics Engineers, May 2000.

1999 Walter Fee Outstanding Young Engineer Award, IEEE Power Engineering Society.

1997-98 Distinguished Professor, Department of Electrical and Computer Engineering, UPR Mayagüez.

1998 Distinguished Professor, of the Puerto Rico Professional Engineers and Land Surveyors Association Mayagüez Chapter.

Stratmore's Who's Who 1998-99 Edition.

NASA Summer Faculty Fellowship, June to August 1997.

Air Force Office of Scientific Research Summer Research Faculty Fellowship, June to August 1996.

Grass Instruments Fellowship, January to May 1992.

Fellow of the AT&T Cooperative Research Fellowship Program, June 1985 to December 1991.

Recipient of the Georg Simon Ohm Award for the best student of the 1985 UPR Electrical Engineering Graduating Class.

National Dean's List 1981-1985.

Honor Student UPR Engineering Faculty 1980-1985.

Honorary memberships in:

Sigma XI Honor Society

Tau Beta Pi Honor Society

Phi Kappa Phi Honor Society

Professional Memberships and Affiliations:

Licensed Engineer in Puerto Rico since 1996

Colegio de Ingenieros y Agrimensores de Puerto Rico

Institute for Electrical and Electronics Engineers (IEEE)

President IEEE Puerto Rico Western Chapter since April 1998-2000

Vice-President IEEE Puerto Rico Western Chapter from January 1995 to April 1998

Sociedad de Ingenieros Electricistas de Puerto Rico 1998-2001

American Society for Engineering Education

American Meteorological Society

SPIE – The International Society for Optical Engineering

SIAM- Society for Industrial and Applied Mathematics

Academic Service Activities:

Chairman, 2002 IEEE Workshop on Computers in Power Electronics

Associate Editor, IEEE Transactions on Power Electronics Special Issue on Digital Control, 2002

Region 9 Representative, IEEE Power Electronics Society Executive Committee. 2000-current

Member, IASTED Technical Committee on Control.

Member, IEEE Power Electronics Society Committee on Modeling and Simulation.

Program Committee Member, IEEE Applied Power Electronics Conference, 2000, 2001, 2002.

Program Committee Member, IASTED Intelligent Systems and Control Conference.

Program Committee Member, 2004 SPIE Conference on Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery X.

Reviewer for

Annual Meeting of the IEEE Industry Applications Society

ASEE Frontiers in Education Conference, San Juan, PR

IEEE Applied Power Electronics Conference

IEEE Power Electronic Specialists Conference

IEEE International Electric Machines and Motor Drives Conference

IEEE Transactions on Industry Applications

IEEE Transactions on Power Electronics

IEEE Transactions on Education

IEEE Transactions on Power Systems

IEEE Transactions on Geoscience and Remote Sensing

IEEE Transactions on Control Technology

Served in several NSF Proposal Review Panels

Personal Information:

U.S. Citizen.

Bilingual in Spanish and English.

References:

Available upon request.