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Curriculum Vitae —English—

Luis E. García Castillo

March 2009

PERSONAL, ACADEMIC AND PROFESSIONAL DATA

PERSONAL DATA

Last Name, Surname:	García-Castillo, Luis E.
Passport No.:	AE434750
Country:	Spain
Birth Date:	8-Nov-1967
Professional Situation:	Profesor Titular de Universidad (Associate Professor)
Work address:	
	Departamento de Teoría de la Señal y Comunicaciones Universidad Carlos III de Madrid, Escuela Politécnica Superior, Edifiio Torres Quevedo (Dpcho. 4.2.D05), Avda. de la Universidad, 30. 28911 Leganés (Madrid), Spain.
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EDUCATION

- *Ingeniero de Telecomunicación* (M.S. in Electrical Engineering), Universidad Politécnica de Madrid, 1992.

  Title of M.S. Thesis (translated): "Full Wave Analysis of Microwave Waveguiding Structures Using the Finite Element Method with Edge Elements". Advisor: Prof. M. Salazar-Palma.

- *Doctor Ingeniero de Telecomunicación* (Ph.D. in Electrical Engineering), Universidad Politécnica de Madrid, 1998.

  Title of Ph.D. Thesis (translated): "Efficient Techniques in the Application of the Finite Element Method to Electromagnetic Problems". Advisor: Prof. M. Salazar-Palma.

  The Ph.D. Thesis received two prizes from:

  - *Colegio Oficial de Ingenieros de Telecomunicación* (the spanish Institute of Electrical Engineering)
  - Universidad Politécnica de Madrid

APPOINTMENTS

- *Becario de Investigación* (Research Assistant)

  Date: September 1st, 1993 – August 31st, 1997
  Dedication: Full time
  University: Universidad Politécnica de Madrid
  College: E.T.S.I. de Telecomunicación
  Department: Señales, Sistemas y Radiocomunicaciones

- *Profesor Titular de Escuela Universitaria Interino* (temporary holder of an Associate Professor position)

  Date: October 1997 – April 2000
  Dedication: Full time
  University: Universidad Politécnica de Madrid
  College: E.U.I.T. de Telecomunicación
  Department: Ingeniería Audiovisual y Comunicaciones

- *Profesor Titular de Universidad* (Associate Professor)

  Date: April 2000 – September 2005
  Dedication: Full time
  University: Universidad de Alcalá
  College: Escuela Politécnica Superior
  Department: Teoría de la Señal y Comunicaciones

- *Profesor Titular de Universidad* (Associate Professor)

  Date: October 2005 – present
  Dedication: Full time
  University: Universidad Carlos III de Madrid
  College: Escuela Politécnica Superior
  Department: Teoría de la Señal y Comunicaciones

RESEARCH INTERESTS

Numerical methods (mainly finite elements —FE—) for computational electromagnetics including:

- Higher-order curl-conforming elements
- Open region problems (methods for mesh truncation)

- Hybrid methods (FE, integral approaches and asymptotic techniques)
- Adaptive FE (h and hp types)
- High Performance Computing

TEACHING EXPERIENCE

Undergraduate level:

- *Radiodifusión* (Broadcasting Radio Systems)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica (Universidad de Alcalá)
- *Radiodeterminación* (Radiodetermination Systems)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica (Universidad de Alcalá)
- *Transmisión por Soporte Físico* (Microwave Engineering)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica (Universidad de Alcalá)
- *Sistemas Radioeléctricos* (Introduction to Radio Systems)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica (Universidad de Alcalá)
- *Sistemas de Comunicación* (Communication Systems)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica (Universidad de Alcalá)
- *Redes y Servicios* (Telecommunication Networks and Services)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica (Universidad de Alcalá)
- *Microondas* (Microwave Engineering)
  Degree: M.S. in Electrical Engineering
  College: E.U.I.T. Telecomunicación (Universidad Politécnica de Madrid)
- *Laboratorio de Tecnologías de Radiocomunicación* (Radiocommunication Technology Laboratory)
  Degree: M.S. in Electrical Engineering
  College: E.U.I.T. Telecomunicación (Universidad Politécnica de Madrid)
- *Microondas y Circuitos de Alta Frecuencia* (Microwave Engineering and High Frequency Circuits)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica Superior (Universidad Carlos III de Madrid)

- *Laboratorio de Radiofrecuencia* (Radio Frequency Laboratory)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica Superior (Universidad Carlos III de Madrid)
- *Radiocomunicaciones* (Radio Communication Systems)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica Superior (Universidad Carlos III de Madrid)
- *Análisis y Diseño de Circuitos* (Analysis and Design of Electric Circuits)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica Superior (Universidad Carlos III de Madrid)

Graduate level:

- *Técnicas Avanzadas en Tecnología Radar* (Advanced Radar Techniques)
  Degree: Ph.D. in Electrical Engineering
  College: Escuela Politécnica (Universidad de Alcalá)
- *Propagación, Radiación y Dispersión de Ondas Electromagnéticas* (Propagation, Radiation and Scattering of Electromagnetic Waves)
  Degree: Ph.D. in Electrical Engineering
  College: E.T.S.I. Telecomunicación (Universidad Politécnica de Madrid)
- *Técnicas Avanzadas de Microondas* (Advanced Techniques for Microwave Engineering)
  Degree: M.S. in Electrical Engineering
  College: Escuela Politécnica Superior (Universidad Carlos III de Madrid)

Other courses and seminars:

- "Introduction to Numerical Methods in Electromagnetics" (2 h), Departamento de Señales, Sistemas y Radiocomunicaciones, E.T.S.I. Telecomunicación, Madrid (Spain), March 1995.
- "An Introduction to Computational Electromagnetics", 9th International Travelling Summer Course on Microwaves & Lightwaves, University of Roma 'Tor Vergata', Roma (Italy), 1999.
- "Application of the Finite Element Method to the Solution of Frequency Domain and Time Domain Electromagnetic Problems" (6.5 h), **2000 IEEE AP-S Short Courses**, Salt Lake City, Utah, USA, Jul., 2000.
- "An Introduction to Computational Electromagnetics", 11th International Travelling Summer Course on Microwaves & Lightwaves, Universidad Politécnica de Madrid, Madrid (Spain), 2001.
- "Communications" (80 h), III Course for Inclusion in Vigilance Customs Department, Communications Speciality. Escuela de la Hacienda Pública, Madrid (Spain), 2001.

PARTICIPATION IN RESEARCH & DEVELOPMENT PROJECTS FOUNDED BY PUBLIC AGENCIES AND INSTITUTIONS

AS PRINCIPAL INVESTIGATOR

1. *Desarrollo de Antenas Conformadas a Superficies* (Conformal Antennas).

   Financial entity: *Ministerio de Ciencia y Tecnología* (National Board for Research in Science and Technology) under Proyect TIC2001-1019.

   Duration: January 2002 – January 2005

   Number of researchers: 7

   Budget: 73678 EUR

2. *Simulador Electromagnetico Haciendo Uso de Procedimientos Autoadaptativos hp* (Electromagnetic Simulator Making Use of *hp* Autoadaptive Procedures).

   Financial entity: *Ministerio de Educación y Ciencia* (National Board for Research in Education and Science) under Proyect TEC2004-06252/TCM.

   Duration: December 2004 – December 2007

   Number of researchers: 8

   Budget: 59.660,00 EUR

3. *Paralelización de Simulador Electromagnético para el Análisis de Antenas y Sección Radar de Objetos* (Parallelization of Electromagnetic Solver for the Analysis of Antennas and Radar Cross Section of Objects).

   Financial entity: Regional Government of Madrid, Proyect CAM-UAH 2005/042 of IV PRICIT (Regional Planning of Scientific Research and Technology Innovation)

   Duration: January-2006 – December-2006

   Number of researchers: 9

   Budget: 17400 EUR

4. Self-Adaptive Electromagnetic Solver Using *hp*-Finite Elements for the Analysis of the Scattering and Radiation of Electromagnetic Waves.

   Financial entity: European Office of Aerospace Research & Development (EOARD), detachment of the Air Force Office of Scientific Research (AFOSR), directorate of the Air Force Research Laboratory (AFRL), USA.

Duration: April 2007 – March 2008

Number of researchers: 5

Budget: 25000 USD

5. *Adaptatividad Automática hp en Tres Dimensiones para el Análisis de Dispositivos Pasivos y Radiantes de Microondas* (Automatic *hp*-Adaptivity in Three Dimensions for the Analysis of Passive and Radiating Structures in Microwave Technology).

   Financial entity: *Ministerio de Educación y Ciencia* (National Board for Research in Education and Science) under Proyect TEC2007-65214/TCM.

   Duration: December 2007 – December 2010

   Number of researchers: 12

   Budget: 85.063,00 EUR

AS RESEARCHER

1. *Antena Adaptativa en Tecnología Monolítica para Comunicaciones por Satélite* (Adaptive Array Antenna in Monolithic Technology for Mobile Satellite Communications).

   Financial entity: National Government of Spain,

   Proyect Id: TIC93-0055-C03-01

   Duration: March 1993 – March 1996

2. *Antenas Adaptativas para Señales de Espectro Ensanchado y Secuencia Directa* (Adaptive Antennas for Direct Sequence Spread Spectrum Signals).

   Financial entity: National Government of Spain,

   Proyect Id: TIC96-0724-C06-01

   Duration: June 1996 – June 1999

3. *Desarrollo de Antenas Multifuncionales Compactas de Alta Eficiencia basadas en EBGs y Metamateriales* (Multifunctional and Compact Antennas of High Efficiency based on EBGs and Metamaterials).

   Financial entity: Regional Government of Madrid, Spain.

   Proyect Id: CCG06-UC3M/TIC-0803

   Duration: January-2007 – December-2007

   Number of researchers: 12

   Budget: 15000 EUR

4. *Desarrollo de Nuevas Antenas Impresas de Banda Ultra Ancha* (Development of New Planar Ultra-Wide Band Antennas).

   Financial entity: Regional Government of Madrid, Spain.

   Proyect Id: CCG07-UC3M/TIC-3393

   Duration: January-2008 – December-2008

   Number of researchers: 12

   Budget: 176000 EUR

5. *TERAENSE: Terahertz Technology for Electromagnetic Sensor Applications.*

   Financial entity: National Government of Spain (CONSOLIDER program)

   Proyect Id: CONSOLIDER CSD2008-0068.

   Duration: December 2008 – December 2013

   Number of researchers: 120

   Budget: 3.5M EUR

PARTICIPATION IN RESEARCH & DEVELOPMENT PROJECTS WITH INSTITUTIONS AND COMPANIES

WITH FOREIGN INSTITUTIONS AND COMPANIES

1. *Application of Wavelets to Finite Element Techniques*

   Company: Nemours & Company

   Duration: During the first stay in Syracuse University (see section of Other Research Activities).

2. *Application of the Finite Element Method for Quasi-Static and Dynamic Analysis of 2D Arbitrarily Shaped Inhomogeneous Anisotropic Multiconductor and Multidielectric Waveguiding Structures utilizing the Classical Elements and Edge Elements*

   Institution: IEEE (through CAEME, University of Utah (USA))

   Duration: 1992–1994

3. *Matrix Pencil for Late Time Response Characterization of Radar Signals*

   Institution: Rome Lab.

   Duration: During the second stay in Syracuse University (see section of Other Research Activities).

4. *Application of the Hilbert Transform to Electromagnetic Phenomena*

   Institution: Rome Lab.

   Duration: During the third stay in Syracuse University (see section of Other Research Activities).

WITH NATIONAL INSTITUTIONS AND COMPANIES

1. *Desarrollo de Diversos Subsistemas de un Interrogador para Radar Secundario Modo-S* (Development of Several Subsystems of a Secondary Radar Mode-S Transponder)

   Company: INISEL-CESELSA (at present INDRA-DTD)

   Duration: May 1993 – December 1993

2. *Desarrollo de Tecnologías Avanzadas de Multiplexores de Radiofrecuencia Espaciales* (Development of Advanced Technologies for Satellite Microwave Multiplexers)

Company: ALCATEL ESPACIO, S.A.

Duration: October 1995 – December 1996

3. *Diseño de un Sistema Adaptativo para Comunicaciones Tácticas* (Design of an Adaptive System for Tactics Communications)

   Company: AMPER Programas de Electrónica y Comunicaciones

   Duration: July 1996 – January 1998

4. *Desarrollo de Herramientas de CAD para la Síntesis de Filtros a Resonadores* (Development of CAD Tools for the Synthesis of Dielectric Resonator Filters)

   Company: ALCATEL ESPACIO S.A.

   Duration: 1997

5. *Desarrollo de Modelos de Banda Ancha para el Diseño de Filtros a Resonadores Dieléctricos* (Development of Wide Band Models for the Synthesis of Dielectric Resonator Filters)

   Company: ALCATEL ESPACIO S.A.

   Duration: June 1998 – June 1999

6. *Subsistema Transmisor-Receptor para un Radar de Baja Probabilidad de Intercepción* (Transmiter-Receiver Subsystem for a Low Probabilty of Interception Radar)

   Company: INDRA SISTEMAS S.A.

   Duration: 1999–2000

7. *Transceptor para Sistemas LMDS con Modulación QAM* (Transceiver for LMDS Systems with QAM Modulation)

   Company: IKUSI

   Duration: 1999–2000

SCIENTIFIC PUBLICATIONS

BOOKS

1. M. Salazar-Palma, T. K. Sarkar, L. E. García-Castillo, T. Roy, and A. R. Djordjevic, *Iterative and Self-Adaptive Finite-Elements in Electromagnetic Modeling*, Artech House Publishers, Inc., Norwood, MA, 1998.

2. T. K. Sarkar, M. Salazar-Palma, M. C. Wicks, et al., *Wavelet Applications in Engineering Electromagnetics*, Artech House Publishers, Inc., Norwood, MA, 2002.

CHAPTERS IN BOOKS

1. M. Salazar-Palma and L. E. García-Castillo, *Finite Element Software for Microwave Engineering*, chapter "Self-Adaptive Procedures for Waveguiding Structures Analysis", pp. 401–432, Wiley Series in Microwave and Optical Engineering. John Wiley & Sons, Inc., 1996.

CONTRIBUTIONS OF CHAPTERS IN BOOKS

1. T. K. Sarkar, L. E. García-Castillo, M. Salazar-Palma, T. Roy, and R. S. Adve, "Solution of Maxwell's equations by using wavelet concepts," in *Electromagnetic Environments and Consequences*, J. Serafin, P. Dupouy, and J. C. Bolomey, Eds., 1995, pp. 1604–1612, Chapter 17.2, Part. 2.

ARTICLES IN BOOKS

1. T. K. Sarkar, L. E. García-Castillo, M. Salazar-Palma, T. Roy, and R. S. Adve, "Utilization of wavelet concepts in finite elements for efficient solution of Maxwell's equations," in *Ultra-Wideband Short-Pulse Electromagnetics 2*, I. Carin and L. R. Paulsen, Eds., 1995, vol. 2, pp. 465–473.

ARTICLES IN INTERNATIONAL JOURNALS

1. T. K. Sarkar, R. S. Adve, L. E. García-Castillo, and M. Salazar-Palma, "Utilization of wavelet concepts in finite elements for efficient solution of differential form of Maxwell's equations," *Radio Science*, vol. 29, no. 4, pp. 965–977, Jul-Aug 1994, **Invited paper** in special issue on "Fast Forward and Inverse Scattering Methods".

2. L. E. García-Castillo, T. K. Sarkar, and M. Salazar-Palma, "An efficient finite element method employing wavelet type basis functions," *The International Journal for Computation and Mathematics in Electric and Electronic Engineering —COMPEL—*, vol. 13, Sup. A, pp. 287–292, May 1994.

3. L. E. García-Castillo, M. Salazar-Palma, T. K. Sarkar, and R. S. Adve, "Efficient solution of the differential form of Maxwell's equations in rectangular regions," *IEEE Transactions on Microwave Theory and Techniques*, vol. 43, no. 3, pp. 647–654, Mar. 1995.

4. J. I. Alonso-Montes, J. M. Blas, L. E. García-Castillo, J. Ramos, J. de Pablos, J. Grajal, G. Gentili, J. Gismero, and F. Pérez-Martínez, "Low cost electronically steered antenna and receiver system for mobile satellite communications," *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 12, pp. 2438–2449, Dec. 1996.

5. G. G. Gentili, L. E. García-Castillo, M. Salazar-Palma, and F. Pérez-Martínez, "Green's function analysis of single and stacked rectangular microstrip patch antennas enclosed in a cavity," *IEEE Transactions on Antennas and Propagation*, vol. 45, no. 4, pp. 573–579, Apr. 1997.

6. T. K. Sarkar, C. Su, R. S. Adve, M. Salazar-Palma, L. E. García-Castillo, and R. R. Boix, "A tutorial on wavelets from an electrical engineering perspective. Part I: Discrete wavelet techniques," *IEEE Antennas and Propagation Magazine*, vol. 40, no. 5, pp. 49–70, Oct. 1998, **Invited paper**.

7. L. E. García-Castillo and M. Salazar-Palma, "Second-order Nédélec tetrahedral element for computational electromagnetics," *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields (John Wiley & Sons, Inc.)*, vol. 13, no. 2-3, pp. 261–287, March-June 2000.

8. L. E. García-Castillo, A. J. Ruiz-Genovés, I. Gómez-Revuelto, M. Salazar-Palma, and Tapan K. Sarkar, "Third-order Nédélec curl-conforming finite element," *IEEE Transactions on Magnetics*, vol. 38, no. 5, pp. 2370–2372, Sept. 2002.

9. Ignacio Gómez-Revuelto, L. E. García-Castillo, F. Sáez de Adana, M. Salazar-Palma, and T. K. Sarkar, "A novel hybrid FEM high frequency technique for the analysis of scattering and radiation problems," *Journal of Electromagnetic Waves and Applications*, vol. 18, no. 7, pp. 939–956, 2004.

10. Jayadeep Gopalakrishan, Luis E. García-Castillo, and Leszek F. Demkowicz, "Nédélec spaces in affine coordinates," *Computer & Mathematics with Applications*, vol. 49, no. 7/8, pp. 1285–1294, May-June 2005, doi:10.1016/j.camwa.2004.02.012. Available as TICAM REPORT 03/48, Nov-2003.

11. Luis E. García-Castillo, Ignacio Gómez-Revuelto, F. Sáez de Adana, and M. Salazar-Palma, "A finite element method for the analysis of radiation and scattering of electromagnetic waves on complex environments," *Computer Methods in Applied Mechanics and Engineering*, vol. 194/2-5, pp. 637–655, Feb. 2005.

12. Ignacio Gómez-Revuelto, Luis E. García-Castillo, M. Salazar-Palma, and Tapan K. Sarkar, "Fully coupled hybrid method FEM/high-frequency technique for the analysis of radiation and scattering problems," *Microwave and Optical Technology Letters*, vol. 47, no. 2, pp. 104–107, Oct. 2005.

13. Luis E. García-Castillo, David Pardo, Ignacio Gómez-Revuelto, and Leszek F. Demkowicz, "A two-dimensional self-adaptive *hp*-adaptive finite element method for the characterization of waveguide discontinuities. Part I: Energy-norm based automatic *hp*-adaptivity," *Computer Methods in Applied Mechanics and Engineering*, vol. 196, no. 49–52, pp. 4823–4852, Nov. 2007, doi:10.1016/j.cma.2007.06.024.

14. Luis E. García-Castillo, David Pardo, , Leszek F. Demkowicz, and Carlos Torres-Verdín, "A two-dimensional self-adaptive *hp*-adaptive finite element method for the characterization of waveguide discontinuities. Part II: Goal-oriented *hp*-adaptivity," *Computer Methods in Applied Mechanics and Engineering*, vol. 196, no. 49–52, pp. 4811–4822, Nov. 2007, doi:10.1016/j.cma.2007.06.023.

15. Ignacio Gómez-Revuelto, Luis E. García-Castillo, David Pardo, and Leszek F. Demkowicz, "A two-dimensional self-adaptive *hp* finite element method for the analysis of open region problems in electromagnetics," *IEEE Transactions on Magnetics*, vol. 43, no. 4, pp. 1337–1340, Apr. 2007.

16. Raúl Fernández-Recio, Luis E. García-Castillo, Ignacio Gómez-Revuelto, and M. Salazar-Palma, "Fully coupled multi-hybrid FEM-PO/PTD-UTD method for the analysis of scattering and radiation problems," *IEEE Transactions on Magnetics*, vol. 43, no. 4, pp. 1341–1344, Apr. 2007.

17. Raúl Fernández-Recio, Luis E. García-Castillo, Ignacio Gómez-Revuelto, and M. Salazar-Palma, "Fully coupled hybrid FEM-UTD method using NURBS for the analysis of radiation problems," *IEEE Transactions on Antennas and Propagation*, vol. 56, no. 3, pp. 774–783, Mar. 2008.

18. Luis E. García-Castillo, David Pardo, and Leszek F. Demkowicz, "Energy-norm based and goal-oriented automatic *hp* adaptivity for electromagnetics, application to the analysis of H-plane and E-plane rectangular waveguide discontinuities," *IEEE Transactions on Microwave Theory and Techniques*, vol. 12, Part. 2, pp. 3039–3049, Dec. 2008, doi:10.1109/TMTT.2008.2007096.

❑ In addition, the following contributions are under review or have been recently submitted:

1. R. Durán-Díaz, R. Rico, Luis E. García-Castillo, I. Gómez-Revuelto, and J. A. Acebrón, "Parallelizing a hybrid finite element-boundary integral method for the analysis of scattering and radiation of electromagnetic waves," (submitted to Finite Elements in Analysis and Design).

2. Jesús Alvarez, Ignacio Gómez-Revuelto, Jose M. Alonso, L. E. García-Castillo, and M. Salazar-Palma, "Fully coupled multi-hybrid FEM-MoM-PO method for scattering and radiation problems," (submitted to Electromagnetics).

3. Daniel Garcia-Doñoro, L. E. García-Castillo, and Ignacio Gómez-Revuelto, "An interface for an *hp*-adaptive finite element package using GiD," (submitted to Finite Elements in Analysis and Design).

ARTICLES IN SPANISH JOURNALS

1. Diego Sánchez-Repila and L. E. García-Castillo, "Software basado en el método de elementos finitos para la enseñanza de electromagnetismo," *Buran*, , no. 22, pp. 19–25, Sept. 2005, ISSN=1698-7047. IEEE Barcelona StudentBranch.

PUBLICATIONS IN CONFERENCE PROCEEDINGS

PUBLICATIONS IN INTERNATIONAL CONFERENCE PROCEEDINGS

1. L. E. García-Castillo and M. Salazar-Palma, "On the use of different formulations based on edge elements for the dynamic analysis of general waveguiding structures by means of the finite element method," in *URSI International Symposium on Electromagnetic Theory*, Sydney (Australia), Aug. 1992, pp. 31–33.

2. L. E. García-Castillo and M. Salazar-Palma, "Dynamic analysis of microwave waveguiding and transmission line structures employing a non standard finite element method," in *First European Conference on Numerical Methods in Engineering*, Bruselas (Bélgica), Sept. 1992, Publicado en "Numerical Methods in Engineering'92", C. H. Hirsch, O. C. Zienkiewicz, E. Oñate, eds., ELSEVIER, 1992, pp. 79–86.

3. L. E. García-Castillo and M. Salazar-Palma, "A non standard finite element method for the dynamic analysis of microwave waveguiding and transmission line structures," in *22nd European Microwave Conference*, Helsinki (Finlandia), Aug. 1992, pp. 1012–1017.

4. L. E. García-Castillo and M. Salazar-Palma, "A non standard finite element method for the dynamic analysis of microwave transmission line and waveguiding structures," in *Third International Conference on Electromagnetic Interference & Compatibility (INCEMIC)*, Calcutta (India), Dec. 1992, pp. 20–23.

5. M. Salazar-Palma, L. E. García-Castillo, and J. F. Hernández-Gil, "Characterization of the shielding and proximity effects in multiconductor transmission lines," in *Third International Conference on Electromagnetic Interference & Compatibility (INCEMIC)*, Calcutta (India), Dec. 1992, pp. 3–6.

6. L. E. García-Castillo, M. Salazar-Palma, and T. K. Sarkar, "Introduction of wavelets concepts into finite element techniques," in *1993 USNC/URSI Radio Science Meeting*, Ann Arbor, Michigan (USA), Jun–Jul. 1993, p. 275.

7. T. K. Sarkar, L. E. García-Castillo, and M. Salazar-Palma, "Wavelets, what does it mean to an engineer?," in *1993 USNC/URSI Radio Science Meeting*, Ann Arbor, Michigan (USA), Jun–Jul. 1993, p. 274.

8. L. E. García-Castillo, T. K. Sarkar, and M. Salazar-Palma, "Utilization of wavelet concepts into the finite element method for efficient solution of Maxwell's equations," in *23rd European Microwave Conference*, Madrid (Spain), Sept. 1993, pp. 125–128.

9. L. E. García-Castillo, T. K. Sarkar, and M. Salazar-Palma, "Wavelets: A promising approach for electromagnetic problems," in *2nd Topical Meeting on Electronic Performance of Electronic Packaging (EPEP)*, Monterey, California (USA), Oct. 1993, pp. 40–42.

10. L. E. García-Castillo, T. K. Sarkar, and M. Salazar-Palma, "Utilization of wavelet concepts for efficient solution of electromagnetic problems," in *4th International Symposium on Recent Advances in Microwave Technology (ISRAMT)*, New Delhi/Agra (India), Dec. 1993, pp. 588–591.

11. T. K. Sarkar, L. E. García-Castillo, and M. Salazar-Palma, "Utilization of wavelet concepts in finite elements for efficient solution of Maxwell´s equations," in *1994 USNC/URSI Radio Science Meeting*, Seattle, Washington (USA), June 1994, p. 7.

12. G. G. Gentili, F. Pérez-Martínez, M. Salazar-Palma, and L. E. García-Castillo, "Analysis of single and stacked microstrip patch antennas residing in a cavity by a Green´s function technique," in *1994 IEEE Antennas and Propagation Society International Symposium (AP-S)*, Seattle, Washington (USA), June 1994, pp. 944–947.

13. M. Salazar-Palma, L. E. García-Castillo, and G. G. Gentili, "A software package for accurate computation of frecuency dependent propagation and circuital parameters of inhomogeneous anisotropic arbitrary shaped multiconductor transmission lines," in *24th European Microwave Conference*, Cannes (France), Sept. 1994, pp. 1709–1714.

14. M. Salazar-Palma, L. E. García-Castillo, G. G. Gentili, and J. F. Hernández-Gil, "A multipurpose software package for accurate electromagnetic analysis and simulation of arbitarry shaped waveguiding structures," in *EMC'94 Roma International Symposium on Electromagnetic Compatibility*, Roma (Italy), Sept. 1994, pp. 140–145.

15. L. E. García-Castillo, T. K. Sarkar, and M. Salazar-Palma, "On the use of wavelet like basis functions for efficient solution of electromagnetic problems," in *1994 International Symposium on Electromagnetic Environments and Consequences (EUROEM)*, Bordeaux (France), May–Jun. 1994, Sesión THa-01-09. 3 pag.

16. G. G. Gentili, L. E. García-Castillo, F. Pérez-Martínez, and M. Salazar-Palma, "Efficient Green´s function analysis of stacked microstrip patch antennas residing in a cavity," in *25th European Microwave Conference*, Bolonia (Italy), Sept. 1995, pp. 105–110.

17. F. Blanc-Castillo, M. Salazar-Palma, and L. E. García-Castillo, "Linear and second order edge-lagrange finite elements for efficient analysis of waveguiding structures with curved contours," in *25th European Microwave Conference*, Bolonia (Italy), Sept. 1995, pp. 444–448.

18. F. Blanc-Castillo, M. Salazar-Palma, and L. E. García-Castillo, "First and second order curved non standard finite elements for the dynamic analysis of waveguiding structures with curved contours," in *1995 USNC/URSI Radio Science Meeting*, New Port Beach, California (USA), June 1995, p. 96.

19. F. Blanc-Castillo, M. Salazar-Palma, and L. E. García-Castillo, "A second order non standard finite element for the dynamic analysis of waveguiding structures," in *1995 USNC/URSI Radio Science Meeting*, New Port Beach, California (USA), June 1995, p. 97.

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29. Raúl Fernández-Recio, L. E. García-Castillo, and Enrique Escolano, "Software educativo basado en la teoría geométrica de la difracción orientado a la enseñanza del electromagnetismo," in *XX Simposium Nacional de la URSI*, Gandía, Valencia (Spain), sep 2005, sesión 1 "Herramientas Didácticas ED", 4 pag CDROM.

30. Raúl Fernández-Recio, Ignacio Gómez-Revuelto, and L. E. García-Castillo, "Método híbrido FEM-GTD/UTD para el análisis de estructuras radiantes haciendo uso de NURBS," in *XX Simposium Nacional de la URSI*, Gandía, Valencia (Spain), sep 2005, sesión 8 "Electromagnetismo EM", 4 pag CDROM.

31. Luis E. García-Castillo, David Pardo, and Leszek F. Demkowicz, "Adaptatividad automática *hp* en electromagnetismo. aplicación al análisis de discontinuidades en guiaonda rectangular en plano h y plano e," in *XX Simposium Nacional de la URSI*, Gandía, Valencia (Spain), sep 2005, sesión 8 "Electromagnetismo EM", 4 pag CDROM.

32. Luis E. García-Castillo, Ignacio Gómez-Revuelto, David Pardo, and Leszek F. Demkowicz, "Método de elementos finitos con adaptatividad *hp* automática para el análisis de problemas abiertos," in *XXI Simposium Nacional de la URSI*, Oviedo, Asturias (Spain), sep 2006.

33. Raúl Fernández-Recio, Luis E. García-Castillo, Ignacio Gómez-Revuelto, and M. Salazar-Palma, "Análisis de estructuras radiantes con un método multihíbrido basado en FEM-PO/PTD-UTD," in *XXI Simposium Nacional de la URSI*, Oviedo, Asturias (Spain), sep 2006.

34. Rosa M. Barrio-Garrido, L. E. García-Castillo, Ignacio Gómez-Revuelto, and M. Salazar-Palma, "Comparativa entre el método rápido de los multipolos (FMM) y el algoritmo de aproximación cruzada adaptativa (ACA)," in *XXII Simposium Nacional de la URSI*, Tenerife (Spain), sep 2007, sesión VI "Electromagnetismo II", 4 pag CDROM.

35. Raúl Fernández-Recio, Luis E. García-Castillo, Ignacio Gómez-Revuelto, and M. Salazar-Palma, "Convergencia de un método de elementos finitos iterativo para problemas abiertos," in *XXII Simposium Nacional de la URSI*, Tenerife (Spain), sep 2007, sesión VI "Electromagnetismo II", 4 pag CDROM.

36. Ignacio Gómez-Revuelto, Luis E. García-Castillo, David Pardo, and Leszek F. Demkowicz, "Comparación entre PML y FEM iterativo para el análisis de problemas abierto mediante adaptabilidad *hp* automática," in *XXII Simposium Nacional de la URSI*, Tenerife (Spain), sep 2007, sesión VI "Electromagnetismo II", 4 pag CDROM.

37. R. Durán-Díaz, R. Rico, Luis E. García-Castillo, I. Gómez-Revuelto, and J. A. Acebrón, "Comparativa de diversas paralelizaciones de un método FEM-HF híbrido para el análisis de la radiación y el scattering de ondas electromagnéticas en entornos complejos," in *XV Jornadas de Concurrencia y Sistemas Distribuidos*, Torremolinos, Málaga (Spain), jun 2007, pp. 259–273.

38. Daniel García-Doñoro, Luis E. García-Castillo, and Ignacio Gómez-Revuelto, "GiDtohp: Interfaz basada en preprocesador GiD para modelado geométrico con adaptatividad automática *hp*," in *XXIII Simposium Nacional de la URSI*, Madrid (Spain), sep 2008.

39. Ignacio Gómez-Revuelto, Luis E. García-Castillo, and Daniel García Doñoro, "Método de elementos finitos *hp* con adaptabilidad automática orientada a un objetivo para problemas abiertos en 2D," in *XXIII Simposium Nacional de la URSI*, Madrid (Spain), sep 2008.

40. Jesús Alvárez, Ignacio Gómez-Revuelto, Jose M. Alonso, Luis E. Garcia-Castillo, and Magdalena Salazar-Palma, "Método multi-híbrido FEM-MoM-PO para el análisis de problemas de dispersión y radiación," in *XXIII Simposium Nacional de la URSI*, Madrid (Spain), sep 2008.

OTHER RESEARCH ACTIVITIES

STAYS IN FOREIGN RESEARCH CENTERS

- Three granted stays in **Syracuse University, New York, USA** (Department of Electrical and Computer Engineering) under the supervision of **Prof. T. K. Sarkar**:

  1. October 1st, 1991 – December 30th, 1991
     Application of wavelet type basis functions and multiresolution analysis to the numerical solution of Maxwell equations.
  2. November 7th, 1994 – February 4th, 1995
     Application of the Matrix Pencil Method to the calculation of scattering parameters of microwave structures and analysis of radar data.
  3. November 14th, 1995 – February 14th, 1996
     Development of a new iterative technique for the 3D analysis of radiation and scattering problems using the Finite Element Method.
     Application of the Hilbert transform to the frequency domain extrapolation of signals corresponding to several electromagnetic phenomena.

- Granted stay at **The Institute for Computational Engineering and Sciences (ICES)** (formerly Texas Institute for Computational and Applied Mathematics (TICAM)), University of texas at Austin, Austin, Texas, USA, as **J. T. Oden Visiting Faculty Fellow**

  Supervisor: **Leszek F. Demkowicz**

  Duration: March 1st, 2003 – September 1st, 2003

- Granted stay at **The Institute for Computational Engineering and Sciences (ICES)**, University of texas at Austin, Austin, Texas, USA, as **J. T. Oden Visiting Faculty Fellow**

  Supervisor: **Leszek F. Demkowicz**

  Duration: April 14th, 2007 – April 29th, 2007

- **University of Florida** (Deparment of Mathematics)

  Supervisor: **Jayadeep Gopalakrishnan**

  Duración: 19 de Julio de 2008 - 30 de Julio de 2008

- **Institute for Computational Engineering and Sciences (ICES)**

  Supervisor: **Leszek F. Demkowicz**

Duración: 13 de Septiembre de 2008 - 27 de Septiembre de 2008

❑ **Basque Center for Applied Mathematics (BCAM)**

Supervisor: **David Pardo Zubiaur**

Duración: 16 de Febrero de 2009 - 19 de Febrero de 2009

SUPERVISOR OF PH. D THESIS

1. Ignacio Gómez Revuelto, *Técnica Híbrida FEM-(PO+PTD) para el Análisis de Problemas Electromagnéticos de Radiación y Dispersión*, Ph.D. thesis, Universidad Politécnica de Madrid, Sept. 2004.

2. Raúl Fernández Recio, *Método Híbrido FEM-UTD para el Análisis de Estructuras Radiantes en Entornos Complejos*, Ph.D. thesis, Universidad de Alcalá, Dec. 2007.

3. Rosa María Barrio Garrido, Ph.D. thesis, (in progress; start in 2006). Topic: Fast integration methods with *hp*-Adaptivity for Electromagnetic Problems.