Curriculum vitae

Prof. Luca PERREGRINI

Updated January 2016

Luca Perregrini was born in Sondrio on March 16, 1964.

He is married with two children and lives in Pavia, Italy.

Education

Ph.D. Degree (1993) in Electronics and Computer Science from the University of Pavia, Italy.

Title of the Ph.D. thesis: "Sviluppo di un algoritmo per l'analisi di risonatori a cavità di forma arbitraria". Advisor: Prof. Paolo Arcioni.

Laurea Degree (1989) in Electronic Engineering from the University of Pavia.

Title of the graduation project: "Un programma per l'ottimizzazione di circuiti planari in guida d'onda". Advisor: Prof. Paolo Arcioni.

Diploma Degree (1983) from the scientific high-school “C. Donegani” in Sondrio, Italy.

Positions

Sept. 2014: he earned the qualification for the full professorship in a nationwide abilitation process (“Abilitazione Scientifica Nazionale”).

Dec. 2004 – now: Associate Professor in electromagnetics at the Dept. of Electronics and Computer Engineering (former Dept. of Electronics), University of Pavia

(qualification for the associate professorship earned in March 2002 in a nationwide competition held at the University of Trento).

Dec. 1992 – Dec. 2004: Assistant Professor in electromagnetics at the Dept. of Electronics, University of Pavia

July 2006: Visiting Professor at the École Polytechnique de Montréal, Montréal, Québec, Canada.

July 2005: Visiting Professor at the École Polytechnique de Montréal, Montréal, Québec, Canada.

Nov. 2002: Visiting Professor at the École Polytechnique de Montréal, Montréal, Québec, Canada.

Nov. 2001: Visiting Professor at the École Polytechnique de Montréal, Montréal, Québec, Canada.

Oct. 1998: Consultant at European Space Agency ESTEC–ESA, Noordwijk, The Netherlands.

Nov. 1989 – Oct. 1992: Ph.D. Student at the Microwave Lab, Dept. of Electronics, University of Pavia. Research topic: development of novel techniques for the analysis and optimization of arbitrarily shaped cavity resonators

Teaching activities

Academic courses responsibilities

Prof. Perregrini has been in charge of the following courses:

Microwave Measurements, Master degree (Laurea Magistrale) in Electronic Engineering, academic years 2014/15 to now.

Campi Elettromagnetici I (Electomagnetic Fields I), Laurea triennale in Ingegneria Elettronica e Informatica, academic years 2010/11 to now.

Misure a Microonde (Microwave Measurements), Laurea Specialistica/Magistrale in Ingegneria Elettronica, academic years 2004/05 to 2013/14.

Campi Elettromagnetici (Elecromagnetic Fields), Laurea triennale in Tecniche della Prevenzione nell'ambiente e nei luoghi di lavoro, academic years 2003/04 to 2011/12.

Teoria dei Circuiti (Circuit Theory), Laurea triennale in Ingegneria Informatica, academic years 2004/05 to 2008/09.

Modelli Numerici per l'Elettromagnetismo (Computational Electromagnetics), Laurea Specialistica in Ingegneria Elettronica, academic year 2004/05.

Microonde (Microwaves), Laurea triennale in Ingegneria Elettronica e delle Telecomunicazioni, academic year 2002/03.

Campi Elettromagnetici (Elecromagnetic Fields), Laurea triennale in Ingegneria Elettronica e delle Telecomunicazioni, academic year 2001/02.

Campi Elettromagnetici (Elecromagnetic Fields), Diploma Universitario in Ingegneria Elettronica, academic years 1995/96 to 2000/01.

Moreover, since graduation, Prof. Perregrini supported the teaching of the following courses with classroom exercises and seminar talks:

Microonde (Microwaves), responsible Prof. P. Arcioni.

Campi Elettromagnetici (Elecromagnetic Fields), responsible Prof. G. Conciauro.

Teoria dei Circuiti (Circuit Theory), responsible Prof. G. Conciauro.

Complementi di Campi Elettromagnetici (Advanced Elecromagnetic Fields), responsible Prof. G. Conciauro.

Antenne e Propagazione (Antennas and Propagation), responsible Prof. M. Bressan.

In May 2000 he taught a course on "mezzi trasmissivi nelle reti pubbliche" in the framework of the Corso per Tecnici di Trasmissione e Commutazione organized by Cooperativa Sociale Educativa ELIS (Roma).

PhD student supervisor

Prof. Perregrini has been the supervisor of the following Ph.D. students:

Giuseppe Siciliano, PhD subject: "Antenna systems for microwave and mm-wave imaging" expected graduation 2018.

Battistutta Simone, PhD subject: "Advanced numerical techniques for electromagnetic modelling," expected graduation 2018.

Stefano Moscato, PhD subject: "Substrate Integrated Waveguide components for the Internet of Things: novel structures, materials, and manufacturing techniques," graduated in 2016.

Andrea Giannini, PhD subject: "Parabolic antennas for space applications," graduated in 2014

Marta Cametti, PhD subject: "Future architectures of ground station antennas for meteorological satellites or deep space communications," graduated in 2012

Marco Pasian, PhD subject: "Periodic Structures for Space and Defence Applications," graduated in 2008

Marco Formaggi, PhD subject: "Enhanced modeling and design of ground station antennas for space applications," graduated in 2007

Simone Germani, PhD subject: "Electromagnetic modeling of periodic and quasi periodic structures for microwave applications," graduated in 2005

MS/BS thesis supervisor

Prof. Perregrini has been the supervisor of the final project of more than **75 Master and Bachelor students**.

Technical activities

Academic committees and responsibilities

1995 – now: Responsible of the Microwave Laboratory of the Dept. of Electronics (now Dept. of Electronics and Computer Engineering) of the University of Pavia

Jan. 2015: Member of the Committee for the Final Examination for the PhD in Telecommunications, Politecnico di Torino.

Oct. 2014: Member of the Committee for the admittance evaluation to the PhD in Electrical, electronic and Computer Engineering, University of Pavia.

Nov. 2010 – Nov. 2013: Responsible for the organization and management of MS courses on Electronic Engineering of the University of Pavia.

July 1998 – Nov. 2012: member of the Scientific Committee and of the Administrative Committee of the Centro Interdipartimentale di Ricerca per la Storia della Tecnica Elettrica (CIRSTE) of the University of Pavia. This research center is in charge for developing and supervising the activities of the Museo della Tecnica Elettrica of the University of Pavia.

Nov. 2000 – March 2012: Member of the "Giunta" (restricted committee) of the Consiglio del Dipartimento di Elettronica of the University of Pavia.

Jan. 2012: External member of the Committee for the Final Examination for the PhD in Electronic Engineering, Università di Bologna.

Nov. 2011 – now: Responsible for the organization and management of the BS courses on Electronic and Computer Engineering of the University of Pavia.

2011: Member of the Committee for the Final Examination for the Dottorato in Ingegneria delle Telecomunicazioni, Facoltà d'Ingegneria, Politecnico di Torino;

2011: Member of the Committee for the Final Examination of the Dottorato in Ingegneria Elettronica, Informatica ed Elettrica, Facoltà d'Ingegneria, Università di Pavia;

Nov. 2010 – Nov. 2011: Responsible for the organization and management of the BS courses on Electronic and Telecommunication Engineering of the University of Pavia.

July 2010 – now: Member of the Ph.D. organization and management committee (Collegio Docenti) of the Ph.D. school in Electrical, Electronics and Computer Engineering of the University of Pavia.

2008: Substitute Member of the Committee for the Final Examination for the Doctorado en Comunicaciones, Universidad Politécnica de Valencia, Spagna;

2008: Member of the Examination Committe of the Esami di Stato di ingegneria at the Università di Pavia.

2007: Member of the Committee for the Final Examination of the Dottorato in Ingegneria Elettronica, Informatica ed Elettrica, Facoltà d'Ingegneria, Università di Pavia;

2007: Member of the Committee for the Final Examination for the Doctorado en Comunicaciones, Universidad Politécnica de Cartagena, Spagna;

2006: Member of the Committee for the Final Examination for the Dottorato di Ricerca in Scienze e Tecnologie dell'Informazione e della Comunicazione, Indirizzo Scienze e Ingegneria dello Spazio, Facoltà d'Ingegneria, Università di Genova;

2005: Member of the Committee for the Final Examination for the Doctorado en Comunicaciones, Universidad Politécnica de Valencia, Spagna;

2003: Member of the Committee for the Final Examination for the Dottorato in Ingegneria delleTelecomunicazioni, Facoltà d'Ingegneria, Politecnico di Torino;

2002 – 2004: Member of the Evaluation Committee of the Diploma Universitario in Ingegneria Elettronica of the Università di Pavia, in the frame work of the CampusOne project.

2001: Member of the Examination committee for Assistent Professor (ING-INF/02) at the Facoltà d'Ingegneria of the Università Politecnica delle Marche (official appointment D.M. n. 2059, 31/10/2001)

2000: Member of the Examination committee for Assistent Professor (K02X) at the Facoltà d'Ingegneria of the Università degli studi di Genova (official appointment D.M. n. 2292, 25/07/2000).

He is routinely a member of the examination committee for the Laurea degree.

Research projects leadership

2015 (24 months): Research contract with Regione Lombardia: "SMARTFOOD", (in cooperation with Whirlpool, Politecnico di Milano, Università di Milano).

2015 (6 months): Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "High Frequency Radomes for Harsh Environment", (in cooperation with FDS ITALY S.r.l. (Italy)).

2013 (6 months): Research contract with Pedrini S.p.A., Carobbio degli Angeli (Italy): "Applicazioni delle microonde alla resinatura di marmi".

2012 (36 months): Research contract with Whirlpool: "Novel configurations for microwave ovens".

2012 (18 months): Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "Ultralight Reflector Mesh Material for Very Large Reflector Antennas", (in cooperation with Space Engineering (Italy), University of Achen (D), Università di Tor Vergata, Rome (Italy)).

2009 (4 months): Research contract with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), Darmstadt (D): "Study on the Feasibility of Multi-satellite Antennas for MTG MDA Stations", (in cooperation with Callisto Ltd (UK), Zelinda (Ireland)).

2009 (18 months): Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "Future Architecture of ESA Deep Space Stations For Enhanced Mission Support", (in cooperation with Callisto Ltd (UK), Zelinda (Ireland)).

2009 (18 months): Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "X/K/Ka Band Dichroic Mirror", (in cooperation with Cobham (UK)).

2009 (11 months): Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "New features for the design of dichroic mirrors: theoretical study and enhanced ACID software release".

2007 (7 months): Research contract with SITEP, S. Stefano di Magra (Italy): "Studio di antenne a riflettore con alimentazione tipo "splash-feed" ad elevate prestazioni per applicazioni navali";

2007 (12 months):Research activity funded by the Università di Pavia: "Analisi di strutture metamateriali a banda elettromagnetica proibita (EBG)".

2005 (18 months):Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "Feasibility study for the use of the K-band (25.5-27 GHz) in the ESA Deep-Space antennas"; (in cooperation with Callisto Ltd (UK), ERA Ltd (UK), Makalumedia (Spain), Zelinda (Ireland)).

2005 (15 months): Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "Feasibility study for the beam aberration correction of beam.waveguide refletor antennas"; (in cooperation with ADS International, Italy).

2004 (24 months): VIGONI/DAAD Project in cooperation with the research group lead by Prof. L.P.Schmidt at the University of Erlanghen (D): "Frequency selective surfaces on silicon substrates for millimeter and sub-millimeter waves applications".

2004 (8 months): Research contract with ARIETE, Moncalvo Versiggia (Italy): "Design of a microwave structure for the melting of metals".

2003 (10 months): Research contract with European Space Operation Center (ESOC), Darmstadt (D) of European Space Agency (ESA): "Development of numerical codes for the design of frequency selective surfaces".

2003 (12 months): Research contract with European Space Research and Technology Center (ESTEC) di Noordwijk (NL) of European Space Agency (ESA): "Theoretical study of electromagnetic band-gap metallo-dielectric structures".

2003 (8 months): Research contract with MIRAD (CH): "Software for the design of inductive dichroic mirrors".

2003 (12 months): Research contract with Faini Antenne, Bussero, (Italy): "Realizzazione di un'interfaccia grafica di gestione del software GRASP".

Research projects partecipation

2015 (6 months) Research project funded by FDS ITALY S.r.l. "Analisi, progettazione e caratterizzazione sperimentale di strutture di compensazione dei giunti e strutture di riduzione della RCS," responsible Dr. M. Pasian.

2015 (3 months) Research project funded by CALLISTO France sarl "The analysis of the interaction between a wideband Quad-Ridge Feed Horn (QRFH) and a cryogenic Dewar," responsible Dr. M. Pasian.

2013 (36 months): Research project funded by AIRC (in cooperation with IEO, "Istituto Europeo di Oncologia"): "Bridging mmWave Biophysics, Safety and Imaging", responsible Dr. M. Pasian.

2012 (36 months): PRIN 2010 funded by MURST: "Etichette e sensori eco-compatibili localizzabili ed identificabilicon tecniche wireless a banda ultra larga (GRETA)", responsible Prof. M. Bozzi.

2011 (12 months): Research project funded by ENI: "Studio teorico e modellazione dell'architettura dei multistrati costituenti il rivestimento dei tubi ricevitori per collettori solari utilizzati nel solare termodinamico a concentrazione (CSP)", responsible Prof. P. Arcioni.

2010 (36 months): Research project funded by Ministero delle Politiche Agricole, Alimentari e Forestali: "BI.CE. - bioetanolo cellulosico - biocombustibili di seconda generazione", responsible Prof. P. Arcioni.

2008 (48 months): COST IC0803 (2008-2012): "RF/Microwave Communication Subsystems for Emerging Wireless Technologies", responsible Prof. P. Arcioni;

2008 (24 months): PRIN 2008 funded by MURST: "Modellistica, progetto e verifica di componenti passivi realizzati in tecnologia SIW (Substrate Integrated Waveguide)", responsible Prof. P. Arcioni.

2005 (24 months): INTAS project funded by the Europea Commission for cooperation with former Soviet Union countries: "Deveopment of high-efficiency numerical methods for the analysis of waveguide components", responsible Dr. M. Bozzi.

2005 (24 months): PRIN 05 funded by MURST: "Antenne riconfigurabili con Micro Electro Mechanical Sistems (MEMS)", responsible Prof. G. Conciauro.

2003 (36 months): Italia–Quebec scientific cooperation funded by Ministero degli Affari Esteri: "Investigation of novel circuits for wide-band multimedia systems", responsible Prof. G. Conciauro.

2002 (24 months): PRIN 02 funded by MURST: "Sviluppo di un algoritmo "S-domain" di uso generale per il CAD di circuiti integrati a microonde riconfigurabili, a controllo micro-elettromeccanic", responsible Prof. G. Conciauro;

2002 (36 months): FIRB 02 funded by MURST: "Metodi innovativi per il modellamento e la progettazione di dispositivi e sottosistemi avanzati a radiofrequenza per comunicazioni multimedia", responsible Prof. G. Conciauro;

2001 (24 months): VIGONI/DAAD Project in cooperation with the research group lead by Prof. H. Hartnagel at the University of Darmstadt (D): "Novel frequency multipliers for millimeter wave frequencies: theoretical study and practical implementation". responsible Prof. G. Conciauro.

2001 (12 months): Research contract with TILAB, Torino (Italy), "Sviluppo di un pacchetto software per l'analisi elettromagnetica di uno specchio dicroico illuminato da un'antenna a tromba corrugata", responsible Prof. G. Conciauro.

2000 (42 months): FP5 European Project on Research and Training Network (RTN): "Millimetre-wave and microwave components design framework for ground and space multimedia networ", responsible Prof. G. Conciauro;

1999 (24 months): PRIN 99 funded by MURST: "Sistemi di antenne a microonde e onde millimetriche per servizi multimediali", responsible Prof. G. Conciauro.

1999 (24 months): ASI 99 funded by Agenzia Spaziale Italiana: "Schiere di antenne riflettenti stampate per applicazioni spaziali", responsible Prof. G. Conciauro.

1999 (12 months): Research contract with CSELT, Torino (Italy): "Sviluppo di un pacchetto software per l'analisi di strutture dicroiche costituite da uno schermo metallico spesso, perforato periodicamente da aperture di forma arbitraria", responsible Prof. G. Conciauro.

1997 (24 months): ASI 97 funded by Agenzia Spaziale Italiana: "Strumenti di progettazione ottimizzata di rete di formazione del fascio in guida d'onda", responsible Prof. G. Conciauro.

1997 (24 months): PRIN 97 funded by MURST: "Sistemi innovativi di antenne in tecnologia planare", responsible Prof. G. Conciauro.

1996 (48 months): FP4 European Project on Training and Mobility of Researchers (TMR): "CAD and verification of novel mm-wave and submm-wave circuit", responsible Prof. G. Conciauro.

Conference organization

2015: Member of the Technical Program Committee (TPC) of the European Microwave Conference, London, UK, Oct. 2016.

2016: Member and Sub-Committee Vice-Chair of the Technical Program Review Committee (TPRC) of the IEEE International Microwave Symposium (IMS), San Francisco, CA, USA, May 2016.

2015: Member of the Technical Program Committee (TPC) of the 2015 International Symposium on Antennas and Propagation (ISAP2015), Hobart Tasmania Australia, Nov. 2015.

2015: Member of the Technical Program Committee (TPC) of the Mediteranean Microwave Symposium (MMS2015), Lecce, Italy, Nov./Dec. 2015.

2015: Session Chairman at the European Microwave Conference, Paris, France, Sept. 2015.

2015: Member of the Technical Program Committee (TPC) of the European Microwave Conference, Paris, France, Sept. 2014.

2015: Session-Chair at the IEEE International Microwave Symposium (IMS), Phoenix, AZ, USA, May 2015.

2015: Member and Sub-Committee Vice-Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Phoenix, AZ, USA, May 2015.

2014: Member of the Technical Program Committee (TPC) of the 14th Mediterranean Microwave Symposium, December 12-14 2014, Marrakech, Morocco.

2014: Session Chairman at the European Microwave Conference, Oct. 2014, Rome, Italy.

2014: Technical Program Committee (TPC) Chair of the European Microwave Conference, Rome, Italy, Oct. 2014.

2014: Member of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Tampa, FL, USA, June 2014.

2014: Session-Chair at the 1st IEEE Numerical Electromagnetic Modeling and Optimization (NEMO) for RF, Microwave, and Terahertz Applications, Pavia, Italy, May 14-16, 2014.

2014: Technical Program Committee (TPC) Chair of the 1st IEEE Numerical Electromagnetic Modeling and Optimization (NEMO) for RF, Microwave, and Terahertz Applications, Pavia, Italy, May 14-16, 2014.

2014: Member of the Technical Program Committee (TPC) of the 2014 International Workshop on Antenna Technology: Small Antennas, Novel EM Structures and Materials, and Applications, March 4-6, 2014, Sydney, Australia.

2013: Member of the Technical Program Committee (TPC) of the IEEE International Microwave and RF Conference, New Delhi, India, Dec. 14-16, 2013.

2013: Session Chairman at the European Microwave Conference, Oct. 2013, Nuremberg, Germany.

2013: Member of the Technical Program Committee (TPC) of the European Microwave Conference, Oct. 2013, Nuremberg, Germany.

2013: Member and Sub-Committee Vice-Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Seattle, WA, USA, June 2013.

2012: Session Chairman at the European Microwave Conference, Oct. 2012, Amsterdam.

2012: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the European Microwave Conference, Oct. 2012, Amsterdam.

2012: Session-Chair at the IEEE International Microwave Symposium (IMS), Montreal, Canada, June 2012.

2012: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Montreal, Canada, June 2012.

2011: Member of the Technical Program Committee (TPC) of the IEEE MTT-S International Microwave Workshop Series (IMWS), Sitges (Barcelona) on Sept. 2011:

2011: Session Chairman at the European Microwave Conference, Sept. 2011, Manchester.

2011: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the European Microwave Conference, Sept. 2011, Manchester.

2011: Session-Chair at the IEEE International Microwave Symposium (IMS), Baltimore, MD, USA, June 2011.

2011: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Baltimore, MD, USA, June 2011.

2010: Session Chairman at the European Microwave Conference, Sept. 2010, Paris.

2010: Member of the Technical Program Committee (TPC) of the European Microwave Conference, Sept. 2010, Paris.

2010: Session-Chair at the IEEE International Microwave Symposium (IMS), Anahaim, CA, USA, June 2010.

2010: Member and Sub-Committee Vice-Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Anahaim, CA, USA, June 2010.

2009: Session Chairman at the European Microwave Conference, Sept. 2009, Rome.

2009: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the European Microwave Conference, Sept. 2009, Rome.

2009: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Boston, MA, USA, June 2009.

2008: Session Chairman at the European Microwave Conference, Oct. 2008, Amsterdam.

2008: Member of the Technical Program Committee (TPC) of the European Microwave Conference, Oct. 2008, Amsterdam.

2008: Session-Chair at the IEEE International Microwave Symposium (IMS), Atlanta, GA, USA, June 2008.

2008: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Atlanta, GA, USA, June 2008.

2007: Member of the Steering Committee of the Seventh International Workshop on Computational Electromagnetics in the Time-Domain (CEM-TD), University of Perugia, Perugia, Italy 15-17 Oct. 2007.

2007: Member and Sub-Committee Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Honolulu, HI, USA, June 2007.

2006: Session-Chair at the IEEE International Microwave Symposium (IMS), San Francisco, CA, USA, June 2006.

2006: Member and Sub-Committee Vice-Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), San Francisco, CA, USA, June 2006.

2005: Session-Chair at the IEEE International Microwave Symposium (IMS), Long Beach, CA, USA, June 2005.

2005: Member and Sub-Committee Vice-Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Long Beach, CA, USA, June 2005.

2004: Session-Chair at the IEEE International Microwave Symposium (IMS), Fort Worth, TX, USA, June 2004.

2004: Member and Sub-Committee Vice-Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Fort Worth, TX, USA, June 2004.

2004: Session Chair at the Progress in Electromagnetics Research Symposium (PIERS), 2004, Pisa, Italy;

2004: Organizer of the session "Dielectric Resonator Filters" at the Progress in Electromagnetics Research Symposium (PIERS), 2004, Pisa, Italy.

2003: Session-Chair at the IEEE International Microwave Symposium (IMS), Philadelphia, PA, USA, June 2003.

2003: Member and Sub-Committee Vice-Chair of the Technical Program Committee (TPC) of the IEEE International Microwave Symposium (IMS), Philadelphia, PA, USA, June 2003.

2003: Session Chair at the Progress in Electromagnetics Research Symposium (PIERS) 2003, Honolulu, HI, USA.

2003: Organizer of the session "Periodic Structures for Space Applications" at the Progress in Electromagnetics Research Symposium (PIERS) 2003, Honolulu, HI, USA;

2000: Organizer of a one-day workshop on Frequency Selective Surfaces in the framework of the Ph.D. school in Electronic and Computer Engineering of the University of Pavia, March 2000.

Invited seminar talks

Aug. 2012: “Achievements and future challenges in the design of microwave and millimeter wave circuits at the university of Pavia”, University of Beijing, Cina.

Aug. 2012: “Numerical algorithms for the analysis and design of passive microwave components”, University of Tianjin, Cina.

June 2011: “Le attività della comunità SIEm in ambito Microonde”, Riunione Annuale della Società Italiana di Elettromagnetismo, Taormina, Italy.

Jan. 2011: “Design of Planar and Substrate Integrated Waveguide Reconfigurable Antennas”, State University of San Diego (CA), USA.

May 2007: "Deep Space Networks (DSNs): past, present and future", Università Politecnica delle Marche, Ancona, Italia.

Nov. 2006: "Research activities on antennas at the University of Pavia (Italy)", Antenna Center of Excellence (ACE) Community meeting, Nice, France.

Nov 2001: "The BI-RME method in electromagnetic Modelling", École Polytechnique de Montréal, Montréal, Québec, Canada.

Jan. 2000: "Modal analysis of frequency selective surfaces powered by the BI–RME method" Facolty of Physics, Albert–Ludwigs Univertität, Freiburg, Germany.

Oct. 1998: "Determination of the TE modes of an arbitrarily shaped waveguide by the BI–RME method", European Space Research and Technology Center (ESTEC) of European Space Agency (ESA), Noordwijk (NL).

July 1998: "ANAPLAN–W: a CAD tool for the analysis of E– and H–plane waveguide components", Jet Propulsion Laboratory (JPL), Pasadena (CA), USA.

Scientific societies

2016 – 2018: Member of the Board of Directors of the European Microwave Association (EuMA).

2013 – now: Member of the Technical Committee MTT–15 on Microwave Field Theory of the IEEE Microwave Theory and Techniques Society.

2011 – 2013: Member of the General Assembly of the European Microwave Association (EuMA), representing Group 3 (Italy, S. Marino and Vatican City).

2007 – now: Member of the European Microwave Association (EuMA).

2005 – now: Member of the Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT).

2002 – now: Member of the Società Italiana di Elettromagnetismo (SIEm).

1997 – now: Member of the Institute of Electrical and Electronics Engineers (IEEE). (Senior Member since April 2013, Fellow since January 2016)

2004: Member of Applied Computational Electromagnetics Society (ACES).

Scientific and award committees

2014: Member of the Prize committee of the Central and Southern Italy IEEE MTT-S/AP-S Chapter.

2014: Member of the Prize Committee at the European Microwave Conference, Oct. 2014, Rome, Italy.

2014: Member of the Prize Committee at the Italian Electromagnetic Conference ("Riunione Nazionale di Elettromagnetismo"), Sept. 2014, Padova, Italy.

2014: Member of the Prize Committee of the 1st IEEE Numerical Electromagnetic Modeling and Optimization (NEMO) for RF, Microwave, and Terahertz Applications. Pavia, Italy, May 14-16, 2014.

June 2013 – now: Member of the Technical Committee MTT–15 "Microwave Field Theory" of the IEEE Microwave Theory and Technique Society.

2013: Member of the Prize committee of the Central and Southern Italy IEEE MTT-S/AP-S Chapter.

2012: Member of the Prize committee of the Central and Southern Italy IEEE MTT-S/AP-S Chapter.

2012: Reviewer of research projects for the Research Foundation Flanders (FWO), Belgium.

2012: Member of the Award Committee at the European Microwave Conference, Oct. 2012, Amsterdam.

2011: Member of the Student Paper Competition Committee at the IEEE International Microwave Symposium (IMS), Baltimore, MD, USA, June 2011.

2010: Member of the Student Paper Competition Committee at the IEEE International Microwave Symposium (IMS), Anahaim, CA, USA, June 2010.

2009: Member of the Prize Committee at the European Microwave Conference, Sept. 2009, Rome.

2009: Reviewer of research projects for the Master Program of The Foundation for Polish Science, Poland.

2005: Member of the Student Paper Competition Committee at the IEEE International Microwave Symposium (IMS), Long Beach, CA, USA, June 2005.

Editorial activities

2015 – now: Associate Editor of the IET Electronic Letters.

June 2015: Gest Editor of the International Journal of Microwave and Wireless Technologies for the special issue on the European Microwave Week 2014.

Jan. 2015: Gest Editor of the IEEE Transactions on Microwave Theory and Techniques for the mini special issue on the IEEE International Conference on Numerical Electromagnetic Modeling and Optimization for RF, microwave, and terahertz applications (NEMO2014).

2013 – now: Associate Editor of the IEEE Transactions on Microwave Theory and Techniques.

2011 – now: Associate Editor of the International Journal of Microwave and Wireless Technologies.

2010 – 2013: Associate Editor of the IEEE Microwave and Wireless Components Letters.

2006: Co-editor (with Dr. M. Bozzi) of the book *Periodic Structures,* Research Signpost.

Active reviewer of the following journals:

– IEEE Transactions on Antennas and Propagation
– IEEE Transactions on Microwave Theory and Techniques
– IEEE Microwave and Wireless Components Letters
– IEEE Antennas and Wireless Propagation Letters
– IET Proceedings on Microwaves, Antennas and Propagation
– IET Electronic Letters
– International Journal of Microwave and Wireless Technologies
– International Journal for Numerical Methods in Engineering
– International Journal of RF and Microwave Computer-Aided Engineering
– Radioscience

Prizes and awards

January 2016: Elevated to IEEE Fellow of the Institute of Electrical and Electronics Engineers (IEEE), with the following citation: “for contributions to numerical techniques for electromagnetic modelling”.

December 2015: Best Paper Award at the 15th Mediterranean Microwave Symposium (MMS2015): C. Tomassoni, L. Silvestri, M. Bozzi, and L. Perregrini, "Novel Substrate Integrated Waveguide Filter Based on Mushroom Resonators," 15th Mediterranean Microwave Symposium (MMS2015), Lecce, Italy, Nov. 30-Dec. 2, 2015.

April 2011: Honorable mention in the Best Student Paper Competition for the paper: M. Cametti, M. Pasian, M.Bozzi, L. Perregrini, "Modeling and Efficiency Investigation of Arrays of Reflector Antennas for Deep Space Communication," 5th European on Antennas and Propagation (EuCAP 2011), Rome, Italy, April 11-15, 2011.

May 2010: Second Award in the Best Student Paper Competition: F. Giuppi, A. Georgiadis, M. Bozzi, S. Via, A. Collado, L. Perregrini, "Hybrid Nonlinear and Electromagnetic Design of an Active Oscillator SIW Cavity Backed Slot Antenna". 27th International Review of Progress in Applied Computational Electromagnetics (ACES 2010), Tampere, Finland, April 25-29, 2010.

April 2010: Best Student Award: F. Giuppi, A. Georgiadis, M. Bozzi, A. Collado, L. Perregrini, "Active Antenna Oscillator Systems in Substrate Integrated Waveguide (SIW) Technology," 4th European Conference on Antennas and Propagation (EuCAP 2010), Barcelona, Spain, April 12-16, 2010.

August 2002: Philips Award for the Best Young Scientist Paper: M. Bozzi and L. Perregrini, "Efficient Analysis of Dichroic Plates for Large Reflector Antennas," XXVII URSI General Assembly, Maastricht, The Netherland, August 17-24, 2002.

Research activities

The research activities developed by Prof. Perregrini lead to the publication of about 80 journal papers and 230 conference papers. Overall, Prof. Perregrini cooperated with more than 40 different institutions and companies and his publication involved more than 120 different co-authors.

The principal research topics and achievements are shortly described in the following.

1) Development of numerical tools for the design of waveguide components

Prof. Perregrini participated to the development of the Boundary Integral – Resonant mode Expansion (BI-RME) method, which represent an original, accurate and very efficient numerical technique for the analysis of waveguides components with arbitrary cross-section.

The BI-RME method is based on a peculiar pole-expansion of the admittance matrix of the components, and all the required poles and corresponding residues are calculated in a single shot by solving a linear eigenvalue matrix equation, thus avoiding repeated frequency-by-frequency calculations.

This numerical technique has been tailored to different classes of components (H-plane waveguide circuits, E-plane waveguide circuits, 3D waveguide circuits, metal insert filters). Moreover, the method has been powered with an optimization tool, based on a perturbation technique that fully exploit the BI-RME peculiarities, thus dramatically reducing the computing time for each optimization step.

Finally, the method has been extended to the case of inhomogeneous materials, such as the dielectric resonator filters.

Main achievements:

- Fully developed softwares (ANAPLAN-W, MORESCA; MIF) for the analysis of classes of waveguide components, released worldwide to companies and universities.
- Derivation of analytical expressions of singular integrals involved in the implementation of the BI-RME method. These formulas resulted very useful also for the implementation of other numerical techniques, and the related published papers are widely cited.
- Optimized design of several components, such as filters, couplers/dividers, phase shifters, orthomode transducer, etc., in cooperation with many companies and research centers.

Main collaborations:

- European Space and Technology Center (ESTEC), Agenzia Spaziale Europea (ESA), Noordwijk, The Netherlands.
- Universidad Politecnica de Valencia, Spain.
- Universidad de Valencia, Spain.
- École Polytechnique de Montréal, Montréal, Québec, Canada.
- Ericcson, Sweden.
- Siemens Telecomunicazioni, Milano, Italia.
- Laben, Vimodrone (MI), Italia.
- Telecom Italia Labs (TILAB), Torino, Italia.

2) Design of microwave structures for particle accelerators

At the beginning of his career, Prof. Perregrini collaborated at the study and design of cavity resonators for particle accelerators. In particular, he studied the problem of the beam instability due to the excitation of high order resonant modes.

Moreover, Prof. Perregrini was also involved in the feasibility study of a Free Electron Laser (ELFA project), in cooperation with the Milan Group of the INFN. In particular, the research group in Pavia proposed the use of the groove guide instead of the commonly used overmoded rectangular waveguide. It has been demonstrated that the electron beam can be easily coupled to the propagating structure, the propagation field is completely under (due to the absence of high order modes) and the beam can be easily monitored due to the lateral accessibility of the groove guide.

Main achievements:

- Development of specialized numerical tools for the optimization of cavity resonators.
- Design of high-order mode free resonant cavities for particle accelerators in cooperation with INFN Laboratori Nazionali di Frascati, Stanford Linear Accelerator.
- The groove guide has been used for the first time for FEL applications, proving superior performance over standard rectangular waveguides.

Main collaborations:

- Laboratori Nazionali INFN di Frascati, Frascati, Italia.
- Sincrotrone di Treste, Trieste, Italia.
- Stanford Linear Accelerator Center, Stanford, CA, USA.
- Laboratorio INFN di Milano, sezione progetto ELFA, Milano, Italia.

3) Modeling of quasi-optical frequency multipliers for millimeter and sub-millimeter waves

This activity aimed to design a quasi-optical frequency multiplier based on an array of antennas, each one loaded with a non-linear device. Nowadays these components are the best candidate to efficiently generate signals in the terahertz frequency range.

A numerical tool was developed and exploited for the design of the array: exploiting the Floquet theorem a unit cell of the linear structure (i.e., one element of the array without the non-linear elements) is modeled by a method of moment technique, thus obtaining an equivalent circuit to be connected to the non-linear element, while the the harmonic balance is used to analysis the resulting lumped element circuit.

Main achievements:

- Implementation of a method of moment technique for the analysis of the linear structure, by including the finite dimensions of the array and the non-uniform distribution of the impinging electromagnetic field.
- Implementation of a genetic algorithm harmonic balance.
- Design and experimental verification of a 255 GHz frequency multiplier based on HBVs.

Main collaborations:

- Technische Universität Darmstadt, Germany.
- Friedrich-Alexander-University of Erlangen-Nuremberg, Germany.

- University of Friburg-Switzerland.

4) Modeling of frequency selective surfaces (FSS)

Prof. Perregrini started the studies on this topic at the University of Pavia in 1999. An original numerical technique (named MoM-BI-RME method) has been developed and exploited for the analysis of inductive and capacitive FSS. These structure are composed by 2D periodically distributed holes in a metallic screen (inductive FSS) or by 2D periodically distributed patches on dielectric substrates. Possibly these structure can be multilayered. The MoM-BI-RME method implements a method of moments (MoM) for the solution of an integral equation obtained by imposing the proper field continuity relation on the surface. The peculiarity of the method is the use of entire domain basis functions, devived by using the BI-RME method. The reaction surface integrals required for filling the MoM matrices are converted into line integrals, thus dramatically improving the efficiency of the algorithm. Moreover, all the quantities needed for the calculation of the line integrals are a by-product of the BI-RME analysis.

In the surface-to-line transformation of the integrals, numerical instabilities may arise when the resonant frequencies of the basis functions and the cutoff frequencies of the Floquet modes are very close. To solve this problem, novel formulas have been derived based on an original application of the scalability of Helmholtz's equation solutions.

More recently, the code has been extended to face the problems of lossy materials, convergence assessment, non-uniform illumination, effect of thermal loads on the FSS performance, power handling capability, derivation of equivalent circuits.

Main achievements:

- Fully developed software tools for the optimized design of multilayered inductive and capacitive FSS.
- Novel formulas for degenerate integrals.
- Design and experimental verification of FSS for ESA deep-space antennas (currently operating in Australia and Argentina)
- Design and experimental verification of low-loss FSS on silicon substrate operating at 300 GHz and 600 GHz.

Main collaborations:

- Telecom Italia Labs (TILAB), Torino, Italia.
- European Space Operation Center (ESOC), Agenzia Spaziale Europea (ESA), Darmstadt, Germany.
- Technische Universität Darmstadt, Germany.
- University of Freiburg, Germany.
- Friedrich-Alexander-University of Erlangen-Nuremberg, Germany.
- Universidad Politecnica de Valencia, Spain.
- Universidad de Valencia, Spain.
- MIRAD Microwave AG, Kronbühl, Switzerland.
- Università di Pisa, Italia.
- Callisto Space, UK.
- Cobham, UK.
- Space Engineering, Italia.

5) Modeling of electromagnetic bandgap structures (EBG)

A modified MoM-BI-RME algoriths has been developed for solving a planar periodic structure aiming at the calculation of the Brillouin diagram. In this case, the method lead to the solution of a transcendental integral equation. An original and very reliable technique has been proposed for determining the zeros of the system matrix determinant.

The developed software has been exploited to design an EBG to be integrated in a GPS antenna to avoid surface waves in the substrate.

Main achievements:

- Software tool for the analysis of EBG structures.
- Design of GPS antennas exploiting the properties of an EBG substrate.

Main collaborations:

- European Space and Technology Center (ESTEC), Agenzia Spaziale Europea (ESA), Noordwijk, Olanda.
- École Polytechnique de Montréal, Montréal, Québec, Canada.

6) Modeling of boxed planar circuits and electromagnetic bandgap structures.

Exploiting the MoM-BIRME method, a code for the analysis of boxed multilayered printed circuits has been developed, replacing the Floquet modes with the resonant modes of the box. A voltage-gap excitation has also been introduced.

Main achievements:

- Software tool for the analysis of boxed multilayered printed circuits.

Main collaborations:

- European Space and Technology Center (ESTEC), Agenzia Spaziale Europea (ESA), Noordwijk, The Netherlands.
- Universidad Politecnica de Cartagena, Spain.

7) Modeling of passive components for RF integrated circuits

This activity, condicted in close cooperation with the microelecronic group of the University of Pavia, aimed to an accurate modeling of inductors integrated in standard tecnologia CMOS or BiCMOS technology.

Main achievements:

- A novel equivalent circuit has been proposed, able to accurately model all the substrate effects.
- An efficient technique for extracting the circuit papameters from wideband measured data.

Main collaborations:

- ST Microelectonics, Milano, Italia.

8) Reflectarrays and reconfigurable antennas

A algorithm for the analysis of printed arrays able to focus an impinging plane wave has been developed. It is based on the analysis of the unit cell of a rigorously periodic structure, in order to determine the reflection coefficient phase shift. Many different element shapes has been studied, in order to determine the most suited for the design of wideband and low-loss reflectarrays.

Beside this, MEMS reconfigurable antennas has been studied, by extending a technique already developed for planar circuit including MEMS.

Main achievements:

- A numerical code for the analysis of a single cell of the reflectarray.
- Proposal of novel figure merit for the systematic comparison of the performance achievable by different element shapes.
- Fabrication and experimental verification of reflectarrays prototypes.
- Design of reconfigurable antennas based on MEMS switches.

Main collaborations:

- University of Perugia, Italia.
- University of Napoli, Italia.

9) Analysis and design of substrate integrated waveguide and components

This activity aims to develop component and circuits based on the substrate integrated waveguide technology, for microwave and millimeter wave applications.

On the one hand, several numerical codes has been developed for the analysis and design of classes of SIW components. On the other hand, these softwares have been exploited for designing new components and to demonstrate the feasibility of standard components in SIW technology.

The mechanisms of loss in SIW interconnects (ohmic, dielectric and radiation losses) has been intensively investigated, resulting in widely adopted guidelines.

Wideband transmission structures, such as the substrate integrated slab waveguide (SISW) have been deeply investigated, as well as slot antennas coupled through SIW cavities has been designed and experimentally verified.

Main achievements:

- Development of a numerical technique, based on the BI-RME method, for the wideband modeling of SIW components, and for the automatic derivation of equivalent circuit models.
- Derivation for the first time of an equivalent rectangular waveguide for SIW interconnects.
- Guidelines for the design of SIW interconnects.
- Development of several innovative components in SIW technology, including the first active antenna appeared in the literature and a steerable active array with no need of phase shifters.

Main collaborations:

- École Polytechnique de Montréal (Montreal, QC, Canada)
- CTTC, Spain

- University of Perugia, Italia.

10) Design of beam-waveguide antennas for deep-space communications

Prof. Perregrini started in Pavia this activity, which has been boosted by many European Space Agency (ESA)contracts, covering several aspects of the ground stations for deep-space communications.

Among the many activities, it is worth citing the feasibility study for the insertion of the K-band in the ESA Deep Space Antenna 2 (DSA2), The study and prototyping of a servo assisted system for the beamd squint of DSA2, the design and installation of dichroic mirros in the ESA DSA1 and DSA3, the strategic study of future architectures for deep-space ground stations.

More recently, alse the Sardinia Radio Telescope has been studied for a possible upgrade to deep-space communication capabilities.

Main achievements:

- Study for the K-band upgrade of DSA2 (presently considered as baseline for DSA3 under construction).
- Design, esperimental verification and installation of dichroic mirrors designed by the group of Pavia using in-house developed software.
- Development of a complete servo-assisted mechanism for the DSA2 beam aberration correction in Ka-band.
- Strategic study for future deep-space ground station architectures.
- Feasibility study for the upgrade of the Sardinia Radio Telescope for deep-space communications.

Main collaborations:

- European Space Operation Center (ESOC), Agenzia Spaziale Europea (ESA), Darmstadt, Germania.
- MIRAD Mikrowellentechnik AG, Waldstatt, Svizzera.
- Telecom Italia Lab (TILAB), Torino, Italia.
- ADS International, Valmadrera, Italia.
- Callisto Ltd, UK.
- ERA Ltd, UK.
- Cobham, UK

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