

Francesco Trevisan was born in Treviso, Italy, in 1964.

He graduated with honours in “Ingegneria Elettrotecnica” (Power Electrical Engineering) in 1988 at the University of Padova (Italy). Since 1991, he has been researcher at the Istituto Gas Ionizzati of the National Research Council in Padova working, with the “Magnet System” group, at the electromagnetic design of the experimental machine RFX (Reverse Field eXperiment) for research on magnetically confined nuclear fusion.

In 1995 he joined, as researcher, the Faculty of Engineering of the University of Udine (Italy); here, he is now full professor teaching “Electrical Sciences” at the “Dipartimento Politecnico di Ingegneria e Architettura” (DPIA), where he is the Research delegate.

According to scopus database, his h-index is 18 and the number of citations is 997. The overall number of scientific papers is 165; he has two patents.

Initially, his research interests have been focused in the area of analysis, synthesis and optimisation of magnetic field configurations with integral methods, in magnetically confined plasmas for fusion research machines like the RFX experiment in Padova, the Madison Symmetric Torus at the University of Wisconsin, Madison (USA), Joint European Torus (JET) at Abingdon (UK), TPE-RX experiment at the Electrotechnical Laboratory (ETL) at Tsukuba (Japan) and ZTH experiment, at the Los Alamos National Laboratory, Los Alamos, New Mexico (USA). Precisely, his research activity, articulates as follows: 1) Development of numerical methods for the synthesis of a prescribed magnetic configuration by means of poloidal or toroidal field coils. 2) Development of dynamic identification methods based on lumped parameters (R, L, M), computed according to an integral formulation, for the identification of the plasma magnetic contour in the presence of eddy currents in surrounding conducting structures. 3) Experimental analysis of magnetic configurations. 4) Development of integral numerical methods for the optimisation of the magnetic configurations produced by poloidal or toroidal field coils. 5) Integral electromagnetic models of superconducting cables for the International Thermonuclear Experimental Reactor (ITER) experiment.

Presently, he works on the theoretical aspects and on the numerical differential formulations for the computation of electric and magnetic fields by means of “Discrete Geometric Approaches”. The applications deal with Computer Aided Design, Electromagnetic non Destructive Evaluations, Anechoic Chamber Modelling, and Biomedical Applications. He is collaborating with national and international research groups and with international laboratories, working on applied computational electromagnetism.

Precisely, he developed original numerical formulations for the solution of static, magneto-quasi static and full wave propagation electromagnetic field problems; he extended the Discrete Geometric Approach also to the time invariant Schrödinger equation for the analysis of pyramidal quantum dots. The developed numerical formulations are both in the frequency domain and in the time domain, directly formulated in discrete (algebraic) manner in terms of global (integral) variables; the domains of interest are 3D, discretized in terms of both tetrahedra and polyhedra. The innovative aspect introduced in Discrete Geometric Approaches, is the discrete counterpart of constitutive relations; they are discretized in terms of stable, consistent symmetric positive definite matrices for general polyhedral meshes.

He has been scientific leader of the following research projects:

From 2014 to 2016 regional project PAR FSC 2007-2013 of FVG region, for “Electromagnetic Compatibility Impact on leisure Yachts”, 24 months.

PRIN 2004: “Application of Methods for Electromagnetic Diagnostic (AMDE)”, 24 months.

POR-FER FVG objective 3 2002-2004: "Methodologies for Electromagnetic non Destructive Testing and Magnetic Shielding", 24 months.

PRIN 2002: "Numerical Implementation of a Finite Formulation of Electromagnetism and Comparative Analysis with Differential and Integral Discretised Approaches", 24 months.

Regional research project 2002 FVG: "Methodologies for electromagnetic non destructive testing ", 24 months.

Responsability of specific tasks within projects:

POCN 2015 "Lab-on-a-chip device for point-of-care diagnostics of the thrombotic risk profile" Proof of Concept Network (PoCN) funded by Area Science Park in Trieste and by Italian Ministry of University and Research (MIUR) (coordinator prof. Ruben Specogna, Udine Research Unit).

PRIN2009 "Innovative Impedance Electric Tomography for in vitro hemostasis imaging", (national coordinator prof. Ruben Specogna, Udine Research Unit).

PRIN2008 "Direct Fuel Cells with protonic conductivity polymeric membrane: non linear multi-physic modelling and structural optimisation and circuit integration" (national coordinator prof. A. Stella, Udine Research Unit);

PRIN2006 "Material Development and Electric Modelling of Direct Methanol Fuel Cells for Mobile Electronic Devices" (national coordinator prof. A. Stella, Udine Research Unit);

PRIN2004 "Development of discrete formulations for modelling complex electromagnetic devices for "multi-physic" problems (national coordinator prof. A. Stella, Udine Research Unit);

FIRB 2001 "Methods and Numerical Models of photonic devices for high capacity networks" (national coordinator prof. C.G. Someda).

PRIN2001 "Methods and Applications for Non Destructive Electromagnetic " (national coordinator prof. R. Martone);

PRIN1998 "Models and Methods for the plasma control in devices for magnetically confined plasmas for thermonuclear fusion research" (national coordinator prof. G. Rubinacci);

C.N.R. research project (1997-1999) "Optimisation Methods for the design of electromagnetic devices" (national coordinator prof. A. Savini).

Fellowships (research or teaching) at Universities or Research Institutes:

From 1990 to 1995, research fellowship at Istituto Gas Ionizzati, National Council of Research, Padova, Italy, RFX experiment.

From 06/1995 to 09/1995, research fellowship at University of Wisconsin a Madison (USA), experiment Madison Symmetric Torus (MST).

From 1-1-1996 to 31-12-1996, research fellowship at Istituto Gas Ionizzati, National Council of Research, Padova, Italy, RFX experiment.

From 10/1996 to 12/1996 research fellowship at JET (Joint European Torus) experiment at Abingdon (UK).

From 07/1997 to 09/1997 research fellowship at ElectroTechnical Laboratory (ETL) at Tsukuba (Japan), TPE-RX experiment.

From 10/1993 to 11/1993 research fellowship at the Los Alamos National Laboratory, Los Alamos, New Mexico (USA), ZTH experiment.

Accademic year 2000/2001, teaching fellowship at Università degli studi di Cagliari, "Automated Design of Electric and Magnetic Devices", 50 hours.

From 05/2010 to 06/2010, teaching fellowship at Ecole Doctorale E.E.A.T.S de Grenoble, Grenoble, (France).

From 06/2012 to 06/2012, teaching fellowship at Ecole Doctorale E.E.A.T.S de Grenoble, Grenoble, (France).

From 11/2004 al 12/2004, Technische Universitat Darmstadt (Germany), Institute fur Theorie Elektromagnetischer Felder.

Editorial Boards

From 2012 to 2015 he has been "Associate Editor" for publication on "IEEE Transactions on Magnetics" of accepted papers from international conferences COMPUMAG 2013 e CEFC 2014.

From 2004 to 2012 he has been member of the "Editorial Board" of the international conference COMPUMAG.

From 2005 to 2012 he has been member of the "Editorial Board" of the international conference CEFC.

In 2006 he has been member of the "Editorial Board" of the international conference OIPE 2006 Sorrento, Italy, 13-15 Sept.

In 2011 he has been member of "Conference Committee" of the international conference ISEM 2011 - 15th International Symposium on Applied Electromagnetics and Mechanics, 6-9 September 2011, Napoli, Italy.

In 2009 he has been a member of the scientific/organizing comitee of the international workshop ACE'09 (Advanced Computational Electromagnetism) held from 12 al 14 January 2009 at "Accademia Nazionale dei Lincei" at Rome (<http://ace2009.uniud.it/>).

From 2003 he is a reviewer for the international Journals IEEE Transactions on Magnetics, International Journal for Numerical Methods in Engineering (J. Wiley) and from 2007 for the Journal of Computational Physics.

Scientific responsibility in research groups:

From 1993 to 1995 he has been in charge, at the "Istituto Gas Ionizzati" in Padova, of the final design of the electromagnetic systems (RGM ed SGPR) dedicated to protect the RFX windings.

In 1995 at the University of Wisconsin a Madison (USA), he has been in charge for the design of the Impulsive Field Error Correction System (IFECS) in Madison Symmetric Torus.

In 1996 at the JET (Joint European Torus) experiment at Abingdon (UK) he has been principal investigator for "Vertical Instabilities of plasma at unitary q" within the Plasma Configurations Group.

In 1997 at the Electrotechnical Laboratory (ETL) at Tsukuba (Japan), he has been principal investigator for the "Determination of the Plasma Position for the TPE-RX Machine".

From 2001 to 2002 he has been Principal Investigator of sub task "Identification of the Current Distribution in the SC conductor" di EFDA (European Fusion Development Agreement, Garching, Germania) Technology Work programme 2001, TW1-TMC/CODES.

From 2004 to 2009 he has been worked with the international group on "Advanced Computational Electromagnetism (ACE) Workshop" (with proff. A. Bossavit, L. Kettunen, R. Kotiuga).

Technological transfer results, patents:

Patent1: he is inventor/co-inventor of the patent number 13735394.2-1559 of 16.12.2014 titled "Method to analyze the cluster formation process in a biological fluid and corresponding analysis apparatus."

Patent2 he is inventor/co-inventor of the patent number 14722754.0-1559 of 18.11.2015 titled "Apparatus for analysing the process of formation of aggregates in a biological fluid and corresponding analysis."