

POLITECNICO DI TORINO
Repository ISTITUZIONALE

Rodolfo Zich: Professor, Scientist, and Innovator with Broad Visions

Original

Rodolfo Zich: Professor, Scientist, and Innovator with Broad Visions / Mezzalama, M.; Graglia, R. D.; Daniele, V.. - ELETTRONICO. - (2024), pp. 31-32. (Intervento presentato al convegno IEEE International Symposium on Antennas and Propagation and INC/USNCURSI Radio Science Meeting (AP-S/INC-USNC-URSI) tenutosi a Firenze (Italy) nel 14-19 July 2024) [10.1109/AP-S/INC-USNC-URSI52054.2024.10686654].

Availability:

This version is available at: 11583/2993411 since: 2024-10-15T12:00:58Z

Publisher:

IEEE

Published

DOI:10.1109/AP-S/INC-USNC-URSI52054.2024.10686654

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

IEEE postprint/Author's Accepted Manuscript

©2024 IEEE. Personal use of this material is permitted. Permission from IEEE must be obtained for all other uses, in any current or future media, including reprinting/republishing this material for advertising or promotional purposes, creating new collecting works, for resale or lists, or reuse of any copyrighted component of this work in other works.

(Article begins on next page)

Rodolfo Zich: Professor, Scientist, and Innovator with Broad Visions

Marco Mezzalama^(1,2), Roberto D. Graglia^(1,2), and Vito Daniele^(1,2)

⁽¹⁾Accademia delle Scienze di Torino, Torino, Italy, <https://www.accademiadelle scienze.it>

⁽²⁾Politecnico di Torino, Torino, Italy, <https://www.polito.it/en>

(marco.mezzalama@polito.it, roberto.graglia@polito.it, vito.daniele@polito.it)

Abstract—Rodolfo S. Zich, vice-rector from 1984 to 1987 and rector of the Politecnico di Torino from 1987 to 2001, was professor of Electromagnetic Fields at the Politecnico di Torino from 1976 to 2012 and then professor emeritus until his death on May 8, 2023. He was a great scholar of applied electromagnetics and one of the main architects of the innovation of the university system in Italy. Following in the footsteps of professor Mario Boella, his mentor, he contributed greatly to consolidating the Turin school of antennas and applied electromagnetics, strengthening institutes and research centers already existing in the area, and creating and leading new ones. Thanks to Rodolfo Zich strategic visions and under his leadership, the Politecnico di Torino, the oldest and already one of the major in Italy, doubled in size. In his professional life he held several high-profile managerial positions and received many honors; among these his induction into the “Accademia delle Scienze di Torino” in 1987 and his nomination to Honorary Life Member of IEEE in 2016. With this writing, all his friends and colleagues at the Accademia delle Scienze di Torino, founded in 1783, honor him by recognizing his successes and scientific achievements.

I. INTRODUCTION

Rodolfo S. Zich was born in Turin, Italy, on 15 July 1939 in a family of mitteleuropean origin. (His father was a blue-collar worker at FIAT.) He graduated with honors in Electronic Engineering at the Politecnico di Torino in 1962 and, from then on, he has always been at the Politecnico where he became assistant professor in 1968, full professor of Electromagnetic Fields in 1976, and then professor emeritus in 2012. He was also an adjunct professor at the University of Illinois at Chicago Circle in 1980/1981. Beside being a great academic, Rodolfo Zich was always and in any case a man projected towards a future that is impossible for most to imagine. He considered himself one of the last Enlighteners and his logic was very simple: “Everything that is not forbidden can be done, if something is right to do, it must be done.”

II. SCIENTIFIC ACTIVITY AND MAJOR ACHIEVEMENTS

Professor Mario Boella of the Politecnico di Torino convinced his eminent student Rodolfo Zich in the early 1960s to study new mathematical methods for representing electromagnetic fields by using circuit formalisms directly derived from Maxwell’s equations, as previously done by Marcuvitz - Schwinger and Marcuvitz-Felsen in their works. (Recall that J.S. Schwinger won the Nobel Prize for Physics in 1965; N. Marcuvitz and L.B. Felsen received the IEEE Heinrich Hertz Medal in 1989 and 1991, respectively.) Rodolfo Zich promoted applied and computational electromagnetics in all its aspects by following this scheme and, incidentally, it

was Rodolfo Zich, rector of the Politecnico di Torino, who officially awarded Nathan Marcuvitz the honorary degree in Electronic Engineering of the Politecnico di Torino in 1993.

The most important results of Rodolfo Zich’s scientific activity are his new developments and improvements of the Marcuvitz-Schwinger circuit formalism. These developments extend the use of the circuit formalism from electromagnetic to elastic fields. Specialized and advanced mathematical techniques, such as Wiener-Hopf factorization, are required to obtain rigorous solutions of circuit networks that model geometric discontinuities. Rodolfo Zich has also made significant contributions to the development of these techniques illustrated in the book [1] of which he is co-author. Rodolfo Zich’s most recent publications in this area are listed in [2]- [10] while his latest (unpublished) work concerns the exact solution of the problem of diffraction by a PEC wedge immersed in a biaxial anisotropic medium. This so far unsolved problem is presented and discussed by his co-authors in a different session of this same IEEE AP-S/URSI symposium. The problem, formulated in terms of Wiener-Hopf equations, is rigorously solved by exact kernel factorization. In this regard we observe that very few canonical problems involving anisotropic media have been solved so far, while the exact solution of canonical problems remains useful for validating widespread numerical solution methods, such as those based on Finite Methods.

III. THE INNOVATION CHAIN AND THE DEVELOPMENT OF THE POLITECNICO DI TORINO

Rodolfo Zich renewed the Politecnico di Torino by foreseeing that university departments should mainly deal with basic research, while applied research and technological transfer should be the responsibility of external institutions and incubators, such as the Istituto Superiore Mario Boella, now Links Foundation, founded and initially directed by Rodolfo Zich. In his vision, innovation for small and medium-sized enterprises should be supported by foundations, such as the Torino Wire-less Foundation, now Piemonte Innova, founded and initially directed by Rodolfo Zich. Finally, financial support for startups and incubators should be provided by venture capital, such as Innogest. All this led to the conception and creation of the new “Cittadella Politecnica” thereby doubling the size of the Politecnico occupying a large part of the area then used by the Italian State Railways, one of the largest industrial complexes of Italy at the end of the nineteenth century. This expansion, obtained with the support and contribution of the Compagnia di San Paolo (one of the oldest and largest philanthropic



Fig. 1. Professors Rodolfo S. Zich (left), Leopold B. Felsen (center) and Nathan Marcuvitz (right) at the second edition of the ICEAA congress held in Turin, Italy, 17-20 September 1991.

foundations in Europe), played a fundamental role in the post-industrial urban restructuring of the city, contributing to its transformation from *Company Town* to city where research, innovation, students, start-ups and businesses meet. The Politecnico and the business and residential center of the city are now located in the same neighborhood. The "Cittadella Politecnica" hosts several startups and the Innovative Business Incubator of the Politecnico (the I3P), founded during Zich's rectorship in 1999. In 2020, I3P was the best public incubator in the world, according to the "UBI World Rankings of Business Incubators and Accelerators" 2019-2020. During his rectorship, he promoted various reforms of the statute of the Politecnico, thus restructuring the existing faculties with the creation of the current departments. He also created the Institute of Human Sciences at the Politecnico di Torino.

IV. INTERNATIONAL RELATIONS AND ITALIAN UNIVERSITY REMODELING.

Rodolfo Zich was one of the main supporters of reforming Italian university courses into 3 plus 2 years (BS and MS) in a way similar to what was being done in other European countries. He also began the first experience of Italian remote (telematic) university, one of the first in Europe, by founding the Nettuno consortium which then became the UNINET-TUNO telematic university. At the same time, he created the PP&S (Problem Posing and Solving) project for high schools, which still exists today. Regarding international relations, he was President of the Columbus cooperation project between the EU and Latin America, Board Member of the Ecole Polytechnique de Paris, board member of ESMU (European Center for Strategic Management of Universities), President of CLUSTER (Cooperative Link University of Science, Technology for Education and Research). Other top management positions held by R. S. Zich are listed in Table I.

Furthermore, Rodolfo Zich was the founder and, until his death, the president of the steering committee of the

TABLE I
MAIN TOP MANAGEMENT POSITIONS HELD BY R. S. ZICH

| | |
|-----------|---|
| 2003/2021 | President Torino Wirelless Foundation (now Piemonte Innova) |
| 2000/2016 | President Istituto Superiore Mario Boella (now Links Foundation) |
| 2008/2015 | Board Member ITT (Italian Institute of Technology) |
| 2013/2014 | Extraordinary Commissioner of the Italian National Metrological Research Institute (INRIM) |
| 2010/2013 | President AICA (Italian Association for Computer Science and Automatic Calculation) |
| 2004/2011 | President CTT (Torino Time Consortium) |
| 2007/2010 | Vice President of the Supervisory Board of Intesa San Paolo |
| 2005/2007 | Member of Confindustria Scientific Committee |
| 2002/2007 | Member of Permanent Commission of the Ministry of University and Research for educational objectives |
| 2001/2005 | Member of the Board of TIM SpA |
| 1999/2003 | President of CSELT (Centro Studi E Laboratori Telecomunicazioni) |
| 2000/2001 | President Scientific Committee of Telecommunications and Information Engineering Research Institute (IRITI) |
| 1987/2001 | Rector of the Politecnico di Torino |
| 1991/1993 | Extraordinary Commissioner of the "Galileo Ferraris" National Electrotechnical Institute (IEN) |

International Conference on Electromagnetics in Advanced Applications (ICEAA); a conference which is well known to many members of the IEEE Antennas and Propagation Society and whose first edition dates back to 1989.

V. CONCLUSIONS

All those who had the privilege of sharing part of their professional career with Prof. Zich are immensely grateful to him for his inspired guidance and friendship.

REFERENCES

- [1] V.G. Daniele, and R.S. Zich, *The Wiener-Hopf Method in Electromagnetics*, pp. 1-367. Schitech Publishing IET, 2014.
- [2] V.G. Daniele, G. Lombardi, and R.S. Zich, "The Scattering by a wedge immersed in an arbitrary linear medium. Network Methods: Electromagnetics vs Elasticity," In preparation
- [3] V.G. Daniele, G. Lombardi, and R.S. Zich, "Physical and Spectral Analysis of a Semi-Infinite Grounded Slab Illuminated by Plane Waves," (2022) IEEE Transactions on Antennas and Propagation, 70 (12), pp. 12104-12119.
- [4] V.G. Daniele, and R.S. Zich, "The Scattering by an Half-plane Embedded in Stratified media. Network Methods: Electromagnetics vs Elasticity," Acc. Sci. Torino Memorie 1 (2021). Scienza dell'Ingegneria
- [5] V.G. Daniele, G. Lombardi, and R.S. Zich, "Radiation and Scattering of an Arbitrarily Flanged Dielectric-Loaded Waveguide," (2019) IEEE Transactions on Antennas and Propagation, 67 (12), art. no. 8886592, pp. 7569-7584.
- [6] V.G. Daniele, G. Lombardi, and R.S. Zich, "The Double PEC Wedge Problem: Diffraction and Total Far Field," (2018) IEEE Transactions on Antennas and Propagation, 66 (12), art. no. 8502119, pp. 6482-6499.
- [7] V.G. Daniele, G. Lombardi, and R.S. Zich, "The scattering of electromagnetic waves by two opposite staggered perfectly electrically conducting half-planes," (2018) Wave Motion, 83, pp. 241-263.
- [8] V.G. Daniele, G. Lombardi, and R.S. Zich, "The Electromagnetic Field for a PEC Wedge Over a Grounded Dielectric Slab: 1. Formulation and Validation," (2017) Radio Science, 52 (12), pp. 1472-1491.
- [9] V.G. Daniele, G. Lombardi, and R.S. Zich, "The Electromagnetic Field for a PEC Wedge Over a Grounded Dielectric Slab: 2. Diffraction, Modal Field, Surface Waves, and Leaky Waves," (2017) Radio Science, 52 (12), pp. 1492-1509.
- [10] V.G. Daniele, G. Lombardi, and R.S. Zich, "Network representations of angular regions for electromagnetic scattering," (2017) PLoS ONE, 12 (8), art. no. e0182763, .