

CV of prof. Carlo Alberto Nucci

Updated April 2023

Biographical notes and career

Born in Bologna, October 21, 1956. Degree in Electrical Engineering in 1981 with honors and 'Luigi Donati' award. Researcher (Assistant professor) in 1983, associate professor in 1992, full professor in 2000.

Teaching

At the Faculty (now School) of Engineering of the University of Bologna:

Courses of

- Power Stations (MS) from 1990 to 1999
- Electrical Power Systems (MS) from 1998 to 2015
- Electrical Power Systems 2 (MS) from 2015 to 2021
- Fundamentals of Power Systems (BS) from 2001 to 2005
- Elements of Electrical Systems and Safety (for Civil Engineering students) from 2007 to 2014
- Electricity Production and Conversion Systems (for Energy Engineering students) from 2014 to 2018
- Electrical Power System e Smart Grids (MS) year 2015, 2018, 2019, 2020
- Electrical Plants (BS) from 2016 to date
- Electrical Power Systems (for Advanced Design students) from 2017 to date
- Electrical Power Systems for Smart Cities (MS) from 2021 to date

At some Post Grade Courses (Masters) of the University of Bologna:

- "Innovation of the maintenance and management of urban and real estate assets", in 2003;
- "Forecast, prevention and control of industrial risk" in 2004;
- "ENI Corporate Master: Plant Design for the Development of Offshore Oil Fields" in 2007;
- "ENI Corporate Master: design of oil & gas plants" in 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015;
- "Electrical Hazard" SAIPEM master in 2011, 2012, 2013, 2014;
- "Safety and prevention in the workplace" Unibo Master in the years 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021.

At the Swiss Federal Institute of Technology, Lausanne, EPFL:

- Instructor at several Post-Grade EES-UETP (Electric Energy Systems –University Enterprise Training Partnership) courses.
- Faculty member of the Post grade course "Génie Electrique" in the years 2001, 2002 and 2003
- Docent of module "Distributed Generation from Renewables" in 2013

In the European association EES-UETP:

- Organizer and instructor of various postgraduate courses
- Program Committee chairman from 2002 to 2007

Research

Head of the Power Systems Laboratory at the Department of Electrical Engineering of the Faculty of Engineering of Bologna since 1994.

Main research topics:

- Electromagnetic Transients of power systems, with particular reference to lightning originated ones
- Lightning performance of distribution and transmission lines
- Fault location in distribution networks

- Dynamics of electric power plants and of power systems, with particular reference to power system restoration after blackouts and to the influence of load modelling on voltage collapse simulations
- Smart Grids and Distribution networks operation in presence of small-scale generating plants
- Smart Cities and Renewable Energy Communities
- Vacuum Circuit Breakers switching overvoltages
- Phasor Measurement Units (PMUs)
- Waste treatment based on Joule-effect in-situ vitrification

Publications

Author or co-author of over 380 scientific papers published on peer reviewed journals or on proceedings of international conferences, of a number of book chapters edited by IEE, Kluwer, Rumenian Academy of Science and WIT press, Springer, and of some IEEE Standards and some CIGRE technical brochures (see list of selected publications).

h-index (Scopus) = 41.

h-index (Google Scholar) =54.

Keynote, plenary speaker, invited lecturer

Invited Keynote plenary speaker and lecturer at international conferences (SIPDA 1997 - Sao Paulo, Brazil; ISH '01 –Bangalore, India; ICHQP'06 – Lisbon, Portugal; PSCC 2008 – Glasgow, UK; IPST'09 - Kyoto, Japan; APECM'10 - Beijing, China; ISGT 20, IWEC'11 - Kyoto; IEEE International Forum Smart Grids for Smart Cities – Paris, 2016; RTSI'18-Palermo; MedPower '18 - Dubrovnik; , SynEnergy Med '19 - Cagliari; PowerTech'19 – Milan, iSPEC2020, CPSE2020) and at foreign universities (Polytechnic of Lausanne, University of Arizona, 'Bangalore Institute of Science', University of Sao Paulo, Polytechnic of Lisbon, Polytechnic University of Bucharest, Doshisha University of Kyoto, University of Seville, 'Seoul National University', University of Budapest, Illinois Institute of Technology, University of Ljubljana, Tsinghua University of Beijing, Shandong University in Jinan). See also selected publication list file for updates.

Research projects

Responsible of several research projects financed by the Italian Ministry of Research and by the Italian Science Foundation (C.N.R.), by European Commission and of several research contracts financed by Italian and foreign companies and universities regarding the following topics: restoration processes after blackouts, lightning interaction with power distribution systems, lightning protection of wind turbines, EMC in power systems, management of distribution networks with high penetration of distributed resources and methods/devices for accomplishing fault location in distribution networks, Phasor Measurement Units, State Estimation of power distribution networks, Smart City and Local Energy Communities.

International services and functions

Within CIGRE (International council on large electric systems):

Member of several working groups, such as CIGRE WG C4.401 'Lightning' (of which has been convener) from 1997 to 2007; CIGRE WG C4.107 'Power quality indices and objectives'; Joint CIGRE/CIREG WG on 'Protection of distribution networks against lightning'; serving as Chairman of CIGRE Study Committee C4 "System Technical Performance" for the period 2006-2012.

Within IEEE:

- Member of IEEE PES Working Groups "Lightning performance of distribution lines" and "Distributed Resources: Modelling and Analysis",

- Chairman of the International Conference IEEE PES 2002 Bologna PowerTech, June 2002
- Chairman of the International Steering Committee of the International Conference IEEE PES PowerTech from 2002 to 2007,
- Chairman of the Italian PES Chapter from 2002 to 2007,
- Region 8 Representative per la “IEEE PES Region 8 (Europe, Middle East and Africa)” and member of IEEE PES Governing Board in 2009 and 2010;
- Member of IEEE Smart Cities Initiative for PES in the years 2012-2014;
- Chair, Technical Program Committee, IEEE Smart Grids World Forum 2012;
- Chair, IEEE/PES Region 8 Scholarship Plus Committee since 2014.
- Member of the IEEE-PES Fellow Committee from 2014 to 2018;
- Member of the IEEE Fellow Committee from 2022 to date.

Within EES-UETP:

Chairman of the “EES-UETP Program Committee” in the period 2002-2007.

At the Swiss Federal Institute of Technology, Lausanne, EPFL:

Member of the Energy board of the Swiss Federal Institute of Technology, Lausanne, from 2007 to 2012.

Within the International Conference on Lightning protection:

- Member of the International Scientific Committee since September 2002
- Vice-President of the Scientific Committee since September 2015
- President of the International Scientific Committee since September 2021

Within EU:

- Panel member (Systems and Communication Engineering) for the ERC Advanced Grants Call 2015, 2017, 2019 and 2020 evaluations;
- Representative for University of Bologna, with voting rights, of EERA AISBL.
- Italian representative in Horizon Europe – Mission Sub Group Climate Neutral and Smart Cities since November 2019.

Services and functions in National Institutions

For the Ministry of University and Research (MUR):

- National representative in Horizon Europe – Mission Climate Neutral and Smart Cities since November 2019;
- Representative for MUR at the Ministry of Ecological Transition since February 2022.

For the University of Bologna:

- Responsible for the Logistics (1995-1999) Committee
- Member of Finance Committee (2002-2006) at the Faculty of Engineering.
- Member of the Research Observatory of the University of Bologna in the period 2004-2010.
- Deputy Dean of the Faculty of Engineering from 2008 up to 2012.
- Coordinator of the BS and MS programs in Electrical Engineering from 2012 to 2018.
- Coordinator of the Thematic Group “Energy” of the University of Bologna since 2017.
- Selected by the University as a member of the Technical Scientific Committee PER (Regional Energy Plan)

Other National services and functions:

- Member of the Group of Experts in evaluation (GEV) for the Italian national research assessment 2011-2014 (VQR 2011-2014).
- President of the national association of university professors of Electric power systems in the three years 2013, 2014, 2015.

- President of the Bologna AEIT Section from May 2016 to January 2019.
- President of the National Technical Committee CT 81 "Lightning protection" since 2016.

Editorial activities

- Editor in Chief of of Electric Power Research Journal (EPSR), Elsevier since January 2010.
- (Previously Regional Editor for Europe, Africa and Mid East since January 2005 of the same journal)
- Guest editor of some Special issues published on IEEE Trans. on EMC, J. of Electrostatics ed EPSR journal (Special Issue of the IEEE Trans. on Electromagnetic Compatibility dedicated to 'Lightning', Vol.40, No.4, November, 1998 - with F. Canavero, M. D'Amore and C. Mazzetti);
- Special Issue of the Journal of Electrostatics dedicated to best selected papers presented at the International Conference on Lightning Protection, 2002, with V. Cooray and F. Rachidi;
- Special issue of the Electric Power Systems Research dedicated to the best papers presented at the International Conference on Power Systems Transients, 2003, with A. Ametani and D. Mader ;
- Special issue of the Electric Power Systems Research dedicated to the best papers presented at the International Conference on Power Systems Transients, 2005, with J. Mahseredjian, S. Pack and L. Prikler.).
- Lead Guest Editor of the Special issue on Smart Cities, with G. Beits and C. Cassandras, Proceedings of the IEEE, 2018.
- Member of the Editorial Board of the Journal of Electric Power and Energy Sources (JEPES), Elsevier.

Awards and Recognitions

- 'Luigi Donati' award, as best student of the Academic Year 1980-81 of the Electrical Engineering Master degree.
- Best paper award, "CIGRE- IFAC International Symposium on Control of Power Plants and Power Systems", Brussels, 2000 for the paper "The black-startup simulation of a repowered thermoelectric unit", in cooperation with A. Borghetti, G. Migliavacca and S. Spelta
- Cigre Technical Committe Award, 2004
- IEEE ed IET Fellowship, 2007
- Best paper award, "Analysis of black-startup and islanding capabilities of a combined cycle power plant" in cooperation with A. Borghetti, M. Bosetti, M. Paolone, G. Ciappi, and A. Solari, 43rd Int. Universities Power Engineering Conference (UPEC), Padua, Sept. 1-4, 2008
- Laurea *Honoris Causa* from University Politehnica of Bucharest, 2008
- Member of the Academy of Science of the Institute of Bologna, 2011
- 'Golde Award' from the International Conference on Lightning Protection, 2012
- CIGRE Fellowship, 2016
- Member of the Academy of Science of the Institute of Bologna, 2017.
- Advisor Professor at Tsinghua University since 2021

Selected publications of C.A. Nucci - April 2023

Journal papers

- [1] Ishimoto K.; Tossani F.; Napolitano F.; Borghetti A.; Nucci C.A., LEMP and ground conductivity impact on the direct lightning performance of a medium-voltage line, «ELECTRIC POWER SYSTEMS RESEARCH», 2023, 214, pp. 108845 - 108853
- [2] K. Ishimoto, Tossani, F., Napolitano, F., Borghetti, A., Nucci, C.A., Direct Lightning Performance of Distribution Lines with Shield Wire Considering LEMP Effect. DOI:10.1109/TPWRD.2021.3053620. pp.76-84. In IEEE TRANSACTIONS ON POWER DELIVERY – 2022, ISSN:0885-8977 vol. 37 (1)

- [3] Cappellaro, Francesca; D'Agosta, Gianluca; De Sabbata, Piero; Barroco, Felipe; Carani, Claudia; Borghetti, Alberto; Lambertini, Luca; Nucci, Carlo Alberto, Implementing energy transition and SDGs targets throughout energy community schemes, «JOURNAL OF URBAN ECOLOGY», 2022, 8, pp. 1 – 9
- [4] F. Tossani, F. Napolitano, K. Ishimoto, A. Borghetti, C.A. Nucci, "A New Calculation Method of the Lightning Electromagnetic Field Considering Variable Return Stroke Velocity." DOI:10.1109/TEMC.2020.3015139. pp.152-159. In IEEE Trans on EMC - ISSN:0018-9375 vol. 63 (1), 2021.
- [5] J.D.R. Penaloza, Borghetti, A., Napolitano, F., Tossani, F., Nucci, C.A., "A New Transient-Based Earth Fault Protection System for Unearthed Meshed Distribution Networks", DOI:10.1109/TPWRD.2020.3022977. pp.2585-2594. In IEEE TRANSACTIONS ON POWER DELIVERY - ISSN:0885-8977 vol. 36 (5), 2021.
- [6] A. Borghetti, Ishimoto, K., Napolitano, F., Nucci, C.A., Tossani, F., "Assessment of the Effects of the Electromagnetic Pulse on the Response of Overhead Distribution Lines to Direct Lightning Strikes", DOI:10.1109/OAJPE.2021.3099596. pp.522-531. In IEEE OPEN ACCESS JOURNAL OF POWER AND ENERGY - ISSN:2687-7910 vol. 8, 2021
- [7] S.O.M. Boulanger, Massari, M., Longo, D., Turillazzi, B., Nucci, C.A., "Designing collaborative energy communities: A european overview", DOI:10.3390/en14248226. pp.8226-8226. In ENERGIES - ISSN:1996-1073 vol. 14 (24), 2021.
- [8] J.D. Rios Penaloza, Adu, J.A., Borghetti, A., Napolitano F., Tossani, F., Nucci, C.A., "Influence of load dynamic response on the stability of microgrids during islanding transition", Electric Power Systems Research, 2021, 190, 106607
- [9] F. Tossani, Napolitano, F., Borghetti, A., Nucci, C.A. Piantini, A., Kim, Y.-S., Choi, S.-K., "Influence of the presence of grounded wires on the lightning performance of a medium-voltage line", Electric Power Systems Research, DOI:10.1016/j.epr.2021.107206. pp.107206-107212.
- [10] J.D. Rios Penaloza, Borghetti, A., Napolitano, F., Tossani, F., Nucci, C.A., "Performance analysis of a transient-based earth fault protection system for unearthed and compensated radial distribution networks", Electric Power Systems Research, 107306, ISSN:0378-7796 vol. 197, 2021.
- [11] F. Napolitano, Penaloza, J.D.R., Tossani, F., Borghetti, A., Nucci, C.A., "Three-phase state estimation of a low-voltage distribution network with Kalman filter", DOI:10.3390/en14217421. pp.1-19. In ENERGIES - ISSN:1996-1073 vol. 14, 2021.
- [12] F. Barroco Fontes Cunha, C. Carani, C.A. Nucci, M. Santana Silva, E. Andrade Torres, "Transitioning to a low carbon society through energy communities: Lessons learned from Brazil and Italy", Energy Research and Social Science, 2021, 75, 101994.
- [13] G. Pulazza, N. Zhang, C. Kang, C.A. Nucci, "Transmission Planning with Battery-based Energy Storage Transportation for Power Systems with High Penetration of Renewable Energy", DOI:10.1109/TPWRS.2021.3069649. pp.4928-4940. In IEEE TRANSACTIONS ON POWER SYSTEMS - ISSN:0885-8950 vol. 36 (6), 2021.
- [14] A. Borghetti, Ferraz, G.M.F., Napolitano, F., Nucci, C.A., Piantini, A., Tossani, F., "Lightning protection of a multi-circuit HV-MV overhead line", Electric Power Systems Research, 2020, 180, 106119
- [15] F. Napolitano, F. Tossani, A. Borghetti, C.A. Nucci and F. Rachidi, "Estimation of the expected annual number of flashovers in power distribution lines due to negative and positive lightning", Electric Power Systems Research, 176. 2019.
- [16] F. Tossani, F. Napolitano, A. Borghetti, C.A. Nucci, "Influence of the Radial Electric Field Appraisal on Lightning-Induced Overvoltages Statistical Assessment", IEEE Transactions on Electromagnetic Compatibility, 61(3): 1-7. 2019.

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- [18] F. Napolitano, F. Tossani, A. Borghetti and C. A. Nucci, "Lightning Performance Assessment of Power Distribution Lines by Means of Stratified Sampling Monte Carlo Method," in *IEEE Transactions on Power Delivery*, vol. 33, no. 5, pp. 2571-2577, Oct. 2018, doi: 10.1109/TPWRD.2018.2795743.
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- [20] O. Andrisano; I. Bartolini; P. Bellavista; A. Boeri; L. Bononi; A. Borghetti; A. Brath; G.E. Corazza; A. Corradi; S. de Miranda; F. Fava; L. Foschini; G. Leoni; D. Longo; M. Milano; F. Napolitano; C.A. Nucci; G. Pasolini; M. Patella; T. Salmon Cinotti; D. Tarchi; F. Ubertini; D. Vigo, "The Need of Multidisciplinary Approaches and Engineering Tools for the Development and Implementation of the Smart City Paradigm", *Proceedings of the IEEE*, Volume: 106, Issue: 4, 2018.
- [21] C.L. Bak, A. Borghetti, J. Glasdam, J. Hjerrild, F. Napolitano, C. A. Nucci, and M. Paolone, "Vacuum circuit breaker modelling for the assessment of transient recovery voltages: Application to various network configurations", *Electr. Power Syst. Res.*, vol. 156: Elsevier B.V., pp. 35–43, 2018.
- [22] A. Borghetti, F. Napolitano, C. A. Nucci, and F. Tossani, "Influence of the return stroke current waveform on the lightning performance of distribution lines", *IEEE Transactions on Power Delivery*, vol. 32, no. 4, pp. 1800-1808, Aug, 2017.
- [23] A. Borghetti, F. Napolitano, C. A. Nucci, and F. Tossani, "Response of distribution networks to direct and indirect lightning: Influence of surge arresters location, flashover occurrence and environmental shielding", *Electr. Power Syst. Res.*, vol. 153: Elsevier, pp. 73–81, dec, 2017.
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- [32] F. Napolitano, A. Borghetti, C. A. Nucci, M. L. B. Martinez, G. P. Lopes, and G. J. G. Dos Santos, "Protection against lightning overvoltages in resonant grounded power distribution networks", *Electric Power Systems Research*, vol. 113, pp. 121-128, 08/2014.
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- [34] A. Necci, G. Antonioni, V. Cozzani, E. Krausmann, A. Borghetti, and C. A. Nucci, "A model for process equipment damage probability assessment due to lightning", *Reliability Engineering & System Safety*, vol. 115, pp. 91 - 99, 7/2013.
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- [10]C.A. Nucci, "Smart grids as enablers for smart cities", Keynote speech, Medpower 2018.
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- [16]C.A. Nucci, "Smart Grids for Smart Cities", IEEE Italy Section Schools on Future Energy Systems, Trento, Jan 26-30, 2015.
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- [18]C.A. Nucci, "The energy policy and the infrastructures in Italy", (invited panel speech), First Global Resource Management Symposium, Kyoto Doshisha University, March 9, 2013
- [19]C.A. Nucci, "Smart grids for Smart Cities. What type of progress in expected", (invited lecture), Italian Cultural Institute in New York, NY city, USA, to be delivered on February 25, 2013.
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