Andrea Alù

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March 31, 2007

EDUCATION

April 27, 2007: PhD in Electronics Engineering of Biomedical Science, Electromagnetics and Telecommunications

University of Roma Tre – Rome, Italy

Research activity on:

- electromagnetic applications of metamaterials at microwave and optical frequencies,
- planar and conformal integrated antennas and circuits,
- numerical methods for electromagnetics.

Significant parts of my PhD research has been conducted at the University of Pennsylvania as a Visiting Graduate Student.

Lecturing and tutoring activity at the University of Pennsylvania and at the University of Roma Tre:

- Electromagnetic Field Theory classes (University of Roma Tre),
- Electromagnetic Field Theory 2 classes (University of Roma Tre),
- Electromagnetic Compatibility classes (University of Roma Tre),
- Electromagnetics 501 (University of Pennsylvania).

Student tutoring for their final dissertation on electromagnetics (University of Roma Tre).

Advisors: Prof. Lucio Vegni (University of Roma Tre) and Prof. Nader Engheta (University of Pennsylvania).

Feb. 10, 2004: MS degree in Environmental Engineering and Economics

University of Roma Tre – Rome, Italy

Thesis dissertation in Environmental Electromagnetics: ***"Technical and Economic Design of Radio-Base Station and Mobile Handset Antennas for UMTS Applications"***

Supervisor Prof. Lucio Vegni

Jan. 28, 2002: Aptitude to the profession of Engineer (100/100 mark)

July 17, 2001: *Laurea* degree in Electronics Engineering (five-year coursework), specializing in Electromagnetics Applied to Telecommunications

University of Roma Tre – Rome, Italy

Summa cum laude (110/110 e lode), 28 classes with an average mark of 29.714/30 and 15 lodi (additional honors points). Awarded as the best average mark all over the country for engineering.

Thesis dissertation in Electromagnetic Fields ***"Design of conformal antennas loaded by complex substrates in a generalized reference system for satellite applications"***

Supervisor: Prof. Lucio Vegni, Co-supervisor: Dr. Filiberto Bilotti.

SHORT COURSES

Feb. 21-26, 2005: ***High-Frequency Techniques and Traveling-Wave Antennas***, European School of Antennas, Antennas Virtual Center of Excellence, organized by Prof. F. Frezza and Prof. S. Maci.

University of Siena, Siena, Italy; University of La Sapienza, Roma, Italy.

Sept. 16-17, 2004: ***The Method of Moments: from Basics to Large-Scale Applications***, 4th Doctoral School on Selected Topics in Electromagnetics, held by Prof. D. Wilton.
XV Riunione Nazionale di Elettromagnetismo, Cagliari, Italy

April 26-30, 2004: ***From Photonic Crystals to Metamaterials: Artificial Materials in Optics***, coordinated by Prof. R. B. Wehrspohn, Prof. K. Busch.
Wilhelm und Else Heraeus - Stiftung, Bad Honnef, Germany

Sept. 8-12, 2003: ***Theory and Applications of PBG Structures used as Artificial Magnetic Conductors and Soft and Hard Surfaces***, held by Prof. P. S. Kildal, Prof. S. Maci.
International Conference on Electromagnetics and Advanced Applications (ICEAA'03) – Torino, Italy

Nov. 20-27, 2002: ***Free and Guided Optical Beams***, 35th Course of the International School of Quantum Electronics, held by Prof. J. Turunen and Prof. M. Santarsiero
"Ettore Majorana" Foundation ad Centre for Scientific Culture – Erice (TP), Italy

Sept. 11-15, 2000: ***Student Course on Electromagnetic Compatibility***
4th European Symposium on Electromagnetic Compatibility – Brugge, Belgium

RESEARCH AND WORK EXPERIENCE

Jan. 2007-Present: Postdoctoral Researcher
University of Pennsylvania – Philadelphia, PA
Research activity on:
- Metamaterial cloaking;
- Metamaterials and metasurfaces;
- Nanocircuits and nanostructures modeling at optical frequencies;
- Plasmonics, nanooptics and nanophotonics.

Faculty Advisor: Prof. Nader Engheta.
Financial sponsors: U.S. Defense Advanced Research Projects Agency (DARPA)/Boeing (account number 544375), DARPA/ONR (account number 545051).

July 2006-Dec. 2006: Visiting graduate student
University of Pennsylvania – Philadelphia, PA
Research activity on:
- Plasmonic resonances and anti-resonances using metamaterials;
- Negative index metamaterials;
- Metamaterials for antenna applications.

Lecturing and tutoring activity in:
- ESE 510 (Electromagnetic Course).

Faculty Advisor: Prof. Nader Engheta.
Financial sponsors: U.S. Defense Advanced Research Projects Agency (DARPA)/Boeing (account number 544375), DARPA/ONR (account number 545051).

June 2006-Dec. 2006: Tutor and teaching assistant
University of Roma Tre – Rome, Italy
For the courses: "Electromagnetic Field Theory" and "Electricity and Magnetism".
Lecturing, examining and tutoring students for the courses and for the final graduation.

Mar. 2006-Feb. 2007: **Adjunct Professor**
University of Roma Tre – Rome, Italy
For the course "Electromagnetic Field Theory 2".

Lecturing, examining and tutoring students for the course and for their final graduation.

Mar. 2006-May 2006: Research Consultant
University of Roma Tre – Rome, Italy
Financial sponsor: European Network of Excellence "METAMORPHOSE – Metamaterials Organized for Radio, Millimeter Wave and Photonics Superlattice Engineering," Grant number NMP3-CT-2004-500252 to Prof. Lucio Vegni.

July 2005-Dec. 2005: Visiting graduate student
University of Pennsylvania – Philadelphia, PA
Research activity on:
- Low-observability and non-invasive probing;
- Metamaterial applications at microwave and optical frequencies.

Faculty Advisor: Prof. Nader Engheta.
Financial sponsor: U.S. Defense Advanced Research Projects Agency (DARPA), administrated by the Office of Naval Research. Grant number N00014-05-1-0862 to Nader Engheta.

April 2005-June 2005: Research Consultant
University of Roma Tre – Rome, Italy
Financial sponsor: European Network of Excellence "METAMORPHOSE – Metamaterials Organized for Radio, Millimeter Wave and Photonics Superlattice Engineering," Grant number NMP3-CT-2004-500252 to Prof. Lucio Vegni.

Aug. 2004-Jan. 2005: Visiting graduate student
University of Pennsylvania – Philadelphia, PA
Research activity on:
- Super-diffraction microwave imaging;
- Metamaterial applications at microwave and optical frequencies.

Faculty Advisor: Prof. Nader Engheta.
Financial sponsor: U.S. Defense Advanced Research Projects Agency (DARPA). Grant number HR0011-04-P-0042 to Nader Engheta.

Feb. 2004-June 2006: Research consultant
Elettronica S.p.A.
Design and construction of broadband printed antennas and phased arrays in circular and double polarization.

April 2003-Mar. 2006: Research consultant
Province of Rome, Italy
Design and validation of electromagnetic software for evaluating the electromagnetic field induced in the environment by radio and TV broadcast antennas.

April 2003-Oct. 2003: Research consultant
Animal Registry Office Consortium (Co. An. An.) – Rome, Italy
Design and modeling of transponders and antennas for wireless electronic animal identification

Feb. 2003-Feb. 2004: Tutor and teaching assistant
University of Roma Tre – Rome, Italy
Tutor of MS students in Environmental Engineering and Economics

June 2002-Sept. 2002: Research consultant
Intercollegiate research centre on Environment Polluting Agents (CIRIAF) – Rome, Italy
Design of new-conception radiating elements for UMTS applications, in particular fractal and conformal antennas in 3-G radio-base and handset systems

Oct. 2001-Nov. 2002: Visiting graduate student

University of Pennsylvania – Philadelphia, PA, USA
Research activity on:
- characterization of left-handed and double-negative materials;
- electromagnetic applications of metamaterials at optical and microwave frequencies.

Advisor: Prof. Nader Engheta

July 2001- Oct. 2001: Research and teaching assistant
University of Roma Tre – Rome, Italy
Laboratory of Applied Electromagnetics, Department of Electronics Engineering
Research activity on:
- conformal antennas and circuits loaded by complex materials;
- numerical modeling of electromagnetic components.

Advisor: Prof. Lucio Vegni

March 2001: Consultant in a work stage
Accenture – Nice and Sophia Antipolis, France

FINANCED RESEARCH PROJECTS

2004-2006: European Network of Excellence "METAMORPHOSE – METAMaterial ORganized for radio, millimetre wave, and PHOtonic Superlattice Engineering"
European Community in the framework of the Sixth Program – Contract Number NMP3-CT-2004-500252
Scientific Coordinator: Prof. Lucio Vegni (University of Roma Tre, Rome, Italy)

2003-2005: Analysis of the Electromagnetic Radio-Frequency Pollution – II part
Province of Rome, Italy
Scientific Coordinator: Prof. Paolo Bernardi (University of La Sapienza, Rome, Italy)

2004: Synthesis of Prediction Models for the Electromagnetic Fields Induced by an RFID Detector
Animal Registry Office Consortium
Scientific Coordinator: Prof. Lucio Vegni (University of Roma Tre, Rome, Italy)

2002-2004: Design of Antennas for UMTS Handsets
Italian Ministry of Communications
Scientific Coordinator: Prof. Lucio Vegni (University of Roma Tre, Rome, Italy)

2002-2004: Design of Antennas for UMTS Radio-Base Stations
Italian Ministry of Communications
Scientific Coordinator: Prof. Lucio Vegni (University of Roma Tre, Rome, Italy)

MEMBER IN CONFERENCE COMMITTEES

March 30-31, 2005: ***3rd Workshop on Metamaterials and Special Materials for Electromagnetic Applications and TLC***
University of Roma Tre, Roma, Italy
Organizing Committee

SCHOLARSHIPS AND AWARDS

October 10, 2006: Incubic/Milton Chang Travel Award

Optical Society of America Member & Education Services Council
For technical merit, to support the participation to Frontiers in Optics 2006, The 90th Annual OSA Meeting, Laser Science XXII, Rochester, NY, October 8-12, 2006.

October 23, 2005: Union Radio-Scientifique Internationale (URSI) Young Scientist Award
URSI General Assembly Young Scientist Award Panel – New Delhi, India
With the paper ***"Low-Damping Guided Modes along Nano-Transmission Lines with Chains of Quadrupolar Resonant Plasmonic Nano-Particles,"*** in Proceedings of the 28th General Assembly of the International Union of Radio Science (URSI), New Delhi, India, October 23-29, 2005.

July 15, 2005: IEEE Antennas and Propagation Society (AP-S) Travel Grant
IEEE and National Science Foundation – Piscataway, NJ,USA
"For technical merit", to support the participation to the IEEE Antennas and Propagation Society (AP-S) Student Contest Award in Washington, DC.

July 6, 2005: IEEE Antennas and Propagation Society (AP-S) Student Contest Award
IEEE Antennas and Propagation Society – Washington, DC, USA
Finalist, with the paper ***"Sub-wavelength Focusing and Negative Refraction along Positive-Index and Negative-Index Plasmonic Nano-Transmission Lines and Nano-Layers,"*** in Proceedings of 2005 IEEE Antennas and Propagation Society (AP-S) International Symposium, Washington, DC, USA, July 3-8, 2005, pp. 35-38, (*invited paper*).

March 15, 2005: European School of Antennas Study Grant
Antennas Virtual Center of Excellence, University of Siena – Siena, Italy
For his scientific record, to promote the attendance of the short course "High-frequency technique and traveling wave antennas" framed in the European School of Antennas.

Sept. 9, 2004: SUMMA Graduate Fellowship in Advanced Electromagnetics
SUMMA Foundation – Albuquerque, NM, USA
"To promote exceptionally creative contributions to the advancement of electromagnetic theory and applications", with the project proposal "Complex Materials with Double-Negative and Single-Negative Parameters and Their Electromagnetic Applications".

June 23, 2004: IEEE Antennas and Propagation Society (AP-S) Student Contest Award
IEEE Antennas and Propagation Society – Monterey, CA, USA
Finalist, with the paper ***"Metamaterial Bilayers for Enhancement of Wave Transmission through a Small Hole in a Flat Perfectly Conducting Screen,"*** in Proceedings of 2004 IEEE Antennas and Propagation Society (AP-S) International Symposium, Monterrey, CA, USA, June 20-26, 2004, pp. 3163-3166, (invited paper).

June 23, 2004: Raj Mittra Travel Grant (RMTG) Junior Researcher Travel Award
RMTG Committee – Houston, TX, USA
"For his scientific record", to attend the 2004 IEEE Antennas and Propagation Society (AP-S) International Symposium and USNC/CNC/URSI National Radio Science Meeting, Monterey, CA, USA, June 20-26, 2004.

May 23, 2004: Union Radio-Scientifique Internationale (URSI) Young Scientist Award
URSI Commission B and the Local Organizing Committee of the 2004 International Symposium on Electromagnetic Theory – Pisa, Italy
With the paper ***"Tunneling and 'Growing Evanescent Envelopes' in a Pair of Cascaded Sets of Frequency-Selective Surfaces in Their Band Gaps,"*** in Proceedings of 2004 International Symposium on Electromagnetic Theory, Pisa, Italy, May 23--27, 2004, pp. 90-92, (invited paper).

June 25, 2003: IEEE Antennas and Propagation Society (AP-S) Student Contest Award
IEEE Antennas and Propagation Society – Columbus, OH, USA

Second prize, with the paper ***"Mode Excitation by a Line Source in a Parallel-Plate Waveguide Filled with a Pair of Parallel Double-Negative and Double-Positive Slabs,"*** in Proceedings of 2003 IEEE Antennas and Propagation Society (AP-S) International Symposium, Columbus, OH, USA, June 22-27, 2003, Vol. III, pp. 359-362, (invited paper).

Feb. 22, 2002: Scipione Bobbio Award
IDIS Foundation "Città della Scienza", together with Campania Region, City of Naples, University of Naples "Federico II" and Province of Naples – Naples, Italy
"For the best thesis dissertation in Electrodynamics discussed in 2001 all over Italy", with the *laurea* dissertation "Design of conformal antennas on complex substrates in generalized geometry for satellite applications".

Oct. 24, 2001: Isabella Sassi Bonadonna Scholarship
Italian Electrical and Electronics Society (AEI) – Milan, Italy
"For the best proposal for a yearlong research project to be developed abroad". The project has been developed at the University of Pennsylvania, under the supervision of Prof. Nader Engheta.

Sep. 27, 2001: Galluzzi for Engineering Award
EniTecnologie, National Institute for the Physics of the Matter (INFM), University of Roma Tre – Rome, Italy
"For his academic record, as the student with the highest mark average graduated in engineering all over Italy in 2001".

INVITED LECTURES AND TUTORIALS

July 22, 2005: "DNG and SNG metamaterials for microwave applications: rectangular and circular patch antenna design"
2005 Distributed European Doctoral School on Metamaterials (organized by METAMORPHOSE Network of Excellence) – San Sebastian, Spain

July 22, 2005: "DNG and SNG metamaterials for microwave applications: polariton and leaky wave antenna design"
2005 Distributed European Doctoral School on Metamaterials (organized by METAMORPHOSE Network of Excellence) – San Sebastian, Spain

Oct. 8, 2004: "Metamaterials: Applications and Technologies"
Secondo Convegno Nazionale delle Microonde nell'Ingegneria e nelle Scienze Applicate (MISA 2004) – Ancona, Italy

PATENTS

P1. United States Patent Application No. 20050031295, with title '**Waveguides and scattering devices incorporating epsilon-negative and/or mu-negative slabs**,' joint inventors: Andrea Alù and Nader Engheta, assignee: The Trustees of the University of Pennsylvania, Feb. 10, 2005, online at: http://www.uspto.gov/patft/index.html.

MEMBERSHIPS AND AFFILIATIONS

- Institute of Electrical and Electronics Engineering (IEEE)
- IEEE Antennas and Propagation Society (AP-S)

Andrea Alù

ACTIVE PEER REVIEWER

- Physical Review B
- Physical Review E
- Physical Review Letters
- IEEE Transactions on Antennas and Propagation
- IEEE Transactions on Microwave Theory and Techniques
- IEEE Antennas and Wireless Propagation Letters
- IEEE OSA Journal of Lightwave Technology
- IEE Electronics Letters
- Journal of the Optical Society of America B
- Optics Express
- Optics Communications
- Optics Letters
- Applied Optics
- Journal of Electromagnetic Waves and Applications
- Progress in Electromagnetics Research (PIER) Book
- Radio Science
- Metamaterials Journal
- Journal of Nanotechnology
- RadioEngineering

SCIENTIFIC PUBLICATIONS

- International Peer Reviewed Conferences

C1. A. Alù, F. Bilotti, and L. Vegni, ***"Analysis of Conformal Antennas in the Generalized Curvilinear Reference System with Bianisotropic Inhomogeneous Substrates,"*** in Proceedings of the 2nd European Workshop on Conformal Antennas (EWCA'01), The Hague, The Netherlands, April 24-25, 2001, (*invited paper*).

C2. A. Alù, F. Bilotti, and L. Vegni, ***"Analysis of Conformal Integrated Antennas for Aircraft and Land Vehicle Communications,"*** in Proceedings of the 8th International Conference on Advances in Communications and Control (COMCON 8), Crete, Greece, pp. 281-286, June 25-29, 2001, (*invited paper*).

C3. F. Bilotti, L. Vegni, and A. Alù, ***"Generalized Transmission Line and Helmholtz Equations for the Analysis of Integrated Conformal Circuits and Antennas,"*** in Proceedings of the International Conference on Electromagnetics in Advanced Applications (ICEAA'01), Turin, Italy, pp. 259-262, September 10-14, 2001.

C4. L. Vegni, A. Alù, and F. Bilotti, ***"Some New Theoretical Developments on Conformal Integrated Antenna Theory,"*** in Proceedings of the 16th International Conference on Applied Electromagnetics and Communications (ICECOM'01), Dubrovnik, Croatia, pp. 120-123, October 1-3, 2001, (*invited paper*).

C5. L. Vegni, A. Alù, and F. Bilotti, ***"Complex Media and Complex Geometries: Latest Frontier in Integrated Circuits,"*** in Proceedings of the NATO Advanced Research Workshop BIANISOTROPICS'02, 9th International Conference on Electromagnetic Complex Media, Marrakech, Morocco, p. 49, May 8-11, 2002, (*invited paper*).

C6. A. Alù, L. Vegni, and F. Bilotti, ***"Microwave Conformal Components with Bianisotropic Media,"*** in Proceedings of the 2002 USNC/URSI National Radio Science Meeting, San Antonio, TX, USA, p.113, June 16-21, 2002, (*invited paper*).

C7. F. Bilotti, A. Alù, and L. Vegni, ***"Effect of Complex Material Cover on Microstrip Patch Antennas,"*** in Proceedings of the 2002 USNC/URSI National Radio Science Meeting, San Antonio, TX, USA, p.114, June 16-21, 2002, (*invited paper*).

C8. L. Vegni, F. Bilotti, and A. Alù, ***"Method of Lines Solution of Integrated Structures Involving Complex Dielectrics,"*** in Proceedings of the 26th General Assembly of the International Union of Radio Science (URSI), Maastricht, The Netherlands, Paper No. 1714, August 17-24, 2002, (*invited paper*).

C9. A. Alù, and N. Engheta, ***"Anomalous Mode Coupling in Guided-Wave Structures Containing Metamaterials with Negative Permittivity and Permeability,"*** in Proceedings of IEEE Nanotechnologies 2002, Washington DC, USA, pp. 233-234, August 26-28, 2002, (*invited paper)*, online at: http://repository.upenn.edu/ese_papers/59/.

C10. A. Alù, F. Bilotti, N. Engheta, and L. Vegni, ***"Il Ruolo dei Materiali Complessi nel Progetto di Componenti a Microonde di Nuova Generazione,"*** in Proceedings of the XIV Riunione Nazionale di Elettromagnetismo Applicato, Ancona, Italy, pp. 416-419, September 16-19, 2002.

C11. A. Alù, F. Bilotti, and L. Vegni, ***"Some Recent Developments in the Modeling of Integrated Antennas,"*** in Proceedings of the European Cooperation in the field of Scientific and Technical Research (COST) Action 284, 2nd Management Committee Business Meeting, Nice, France, p.23, November 11-12, 2002, online at: http://www.cost284report.com/Item.aspx?Id=179#05.

C12. F. Bilotti, A. Alù, and L. Vegni, ***"Recent Developments of Theoretical and Numerical Methods for Studying Integrated Conformal Antennas and Circuits,"*** in Proceedings of the European Cooperation in the field of Scientific and Technical Research (COST) Action 284, 3rd Management Committee Business Meeting, Budapest, Hungary, April 6-8, 2003, online at: http://www.cost284report.com/Item.aspx?Id=180#14.

C13. A. Alù, F. Bilotti, and L. Vegni, ***"Chiral and EBG Materials: Electromagnetic Applications,"*** in Proceedings of the 1st Workshop on Metamaterials and Special Materials for Electromagnetic Applications and TLC, Florence, Italy, p. 12, April 16, 2003, (*invited paper*).

C14. F. Bilotti, L. Vegni, and A. Alù, ***"Efficient Analysis of Sinuous Antennas via a Method of Moment Algorithm Employing Entire Domain Basis Functions,"*** in Proceedings of the 3rd ESA Workshop on Millimetre Wave Technology and Applications: Circuits, Systems, and Measurement Techniques, Espoo, Finland, pp. 395-398, May 21-23, 2003.

C15. A. Alù, and N. Engheta, ***"Mono-Modal Waveguides Filled with a Pair of Parallel Epsilon-Negative (ENG) and Mu-Negative (MNG) Metamaterial Layers,"*** in Proceedings of IEEE MTT-S 2003 International Microwave Symposium (IMS'03), Philadelphia, PA, pp. 313-316, June 8-13, 2003, online at http://repository.upenn.edu/ese_papers/7/.

C16. F. Bilotti, A. Alù, M. Manzini, and L. Vegni ***"Design of Polygonal Patch Antennas with a Broad-Band Behavior via a Proper Perturbation of Conventional Rectangular Radiators,"*** in Proceedings of 2003 IEEE Antennas and Propagation Society (AP-S) International Symposium, Columbus, OH, USA, Vol. 2, pp. 268-271, June 22-27, 2003.

C17. A. Alù, and N. Engheta, ***"Mode Excitation by a Line Source in a Parallel-Plate Waveguide Filled with a Pair of Parallel Double-Negative and Double-Positive Slabs,"*** in Proceedings of 2003 IEEE Antennas and Propagation Society (AP-S) International Symposium, Columbus, OH, USA, Vol. 3, pp. 359-362, June 22-27, 2003, (*invited paper*), online at http://repository.upenn.edu/ese_papers/8/.

C18. A. Alù, and N. Engheta, ***"Resonance Phenomenon in Paired Epsilon-Negative and Mu-Negative Bilayers,"*** in Proceedings of USNC/CNC/URSI National Radio Science Meeting, Columbus, OH, USA, p. 19, June 22-27, 2003, (*invited paper*).

C19. A. Alù, and N. Engheta, ***"Circuit Equivalence of "Growing Exponential" in Pendry's Lens,"*** in Proceedings of USNC/CNC/URSI National Radio Science Meeting, Columbus, OH, USA, p. 22, June 22-27, 2003, (*invited paper*).

C20. L. Vegni, A. Alù, and F. Bilotti, ***"Method of Line Algorithm for the Analysis of Stratified Components with Complex Loading Media,"*** in Proceedings of the XII International Symposium on Theoretical Electrical Engineering (ISTET 03), Warsaw, Poland, Vol. II, pp. 519-522, July 6-9, 2003.

C21. A. Alù, and N. Engheta, ***"Distributed-Circuit-Element Description of Guided-Wave Structures and Cavities Involving Double-Negative or Single-Negative Media,"*** in Proceedings of the SPIE Annual Meeting 2003, Complex Mediums IV: Beyond Linear Isotropic Dielectrics, San Diego, CA, USA, Martin W. McCall, Graeme Dewar, Editors, Vol. 5218, pp. 145-155, August 3-8, 2003.

C22. F. Bilotti, A. Alù, and L. Vegni, ***"New Accurate Formula for the Characteristic Impedance of a Microstrip Line with a Dielectric Overlay,"*** in Proceedings of the International Conference on Electromagnetics in Advanced Applications (ICEAA'03), Turin, Italy, pp. 135-138, September 8-12, 2003.

C23. A. Alù, F. Bilotti, and L. Vegni, ***"Method of Lines Algorithm Applied to Conformal Microwave Components with Complex Loading Media,"*** in Proceedings of the International Conference on Electromagnetics in Advanced Applications (ICEAA'03), Turin, Italy, pp. 217-220, September 8-12, 2003.

C24. A. Alù, and N. Engheta, ***"Resonances in Sub-wavelength Cylindrical Structures Made of Pairs of Double-Negative and Double-Positive or ε-Negative and μ-Negative Coaxial Shells,"*** in Proceedings of the International Conference on Electromagnetics in Advanced Applications (ICEAA'03), Turin, Italy, pp. 435-438, September 8-12, 2003.

C25. A. Alù, F. Bilotti, N. Engheta, and L. Vegni, ***"Power-Transmission Enhancement through a Sub-Wavelength Hole in a Perfect Conductor by Employing Metamaterials,"*** in Proceedings of New Frontiers in Radiation and Guidance Phenomena, Rome, Italy, September 29-30, 2003, (*invited paper*).

C26. A. Alù, F. Bilotti, M. Manzini, and L. Vegni, ***"Polygonal Patch Antennas for UMTS and WLAN Terminals,"*** in Proceedings of the 17th International Conference on Applied Electromagnetics and Communications (ICECOM'03), Dubrovnik, Croatia, pp. 156-159, October 1-3, 2003, (*invited paper*).

C27. A. Alù, L. Vegni, and F. Bilotti, ***"Current Density Dominant Mode on Spiral Patch Antennas,"*** in Proceedings of the 17th International Conference on Applied Electromagnetics and Communications (ICECOM'03), Dubrovnik, Croatia, pp. 175-178, October 1-3, 2003.

C28. A. Alù, and N. Engheta, ***"Sub-Wavelength Resonant Structures Containing Double-Negative (DNG) or Single-Negative (SNG) Media: Planar, Cylindrical and Spherical Cavities,"*** in Proceedings of the Progress in Electromagnetics Research Symposium (PIERS'03), Honolulu, Waikiki, Hawaii, USA, p. 12, October 13-16, 2003, (*invited paper*).

C29. A. Alù, and N. Engheta, ***"'Ideal' Virtual Image Formation and Wave Tunneling in a Lens Made of a Pair of Epsilon-Negative (ENG) and Mu-Negative (MNG) Slabs,"*** in Proceedings of the Progress in Electromagnetics Research Symposium (PIERS'03), Honolulu, Waikiki, Hawaii, USA, p.19, October 13-16, 2003, (*invited paper*).

C30. N. Engheta, and A. Alù, ***"May Cavities and Waveguides be Ultra-Thin and Still Support Resonant Modes When They Contain Double-Negative (DNG) or Single-Negative (SNG) Media?,"*** in Proceedings of the Progress in Electromagnetics Research Symposium (PIERS'03), Honolulu, Waikiki, Hawaii, USA, p. 381, October 13-16, 2003, (*invited paper*).

C31. N. Engheta, and A. Alù, ***"Reconstruction of Evanescent Waves Using Double-Negative (DNG) or Single-Negative (SNG) Media,"*** in Proceedings of the Progress in Electromagnetics Research Symposium (PIERS'03), Honolulu, Waikiki, Hawaii, USA, p. 382, October 13-16, 2003, (*invited paper*).

C32. L. Vegni, F. Bilotti, and A. Alù, ***"Some New Theoretical Insights in the Modeling of Microstrip Antennas with High Impedance Ground Planes,"*** in Proceedings of the Progress in Electromagnetics Research Symposium (PIERS'03), Honolulu, Waikiki, Hawaii, USA, p. 397, October 13-16, 2003, (*invited paper*).

C33. A. Alù, F. Bilotti, and L. Vegni, ***"Conformal Antennas and Complex Materials: a Method of Line Numerical Analysis,"*** in Proceedings of the 3rd European Workshop on Conformal Antennas (EWCA'03), Bonn, Germany, pp. 41-44, October 22-23, 2003.

C34. A. Alù, F. Bilotti, N. Engheta, and L. Vegni, ***"How Metamaterials May Significantly Affect the Wave Transmission through Sub-Wavelength Hole in a Flat Perfectly Conducting Screen,"*** in Proceedings of IEE Seminar on Metamaterials for Microwave and (Sub) millimetre Wave Applications: Photonic Bandgap and Double Negative Designs, Components and Experiments, London, UK, pp. 11/1-11/6, November 24, 2003.

C35. A. Alù, and N. Engheta, ***"Image De-Blurring Using Double-Negative (DNG) or Single-Negative (SNG) Metamaterial Layers,"*** in Proceedings of International Union of Radio Science (URSI) National Radio Science Meeting, Boulder, Colorado, USA, p. 17, January 4-8, 2004.

C36. A. Alù, F. Bilotti, A. Salandrino, and L. Vegni ***"On Equiangular Spiral Patches and Other Rotational Antennas,"*** in Proceedings of the Progress in Electromagnetics Research Symposium (PIERS'04), Pisa, Italy, CD Digest, March 28-31, 2004.

C37. F. Bilotti, A. Alù, and L. Vegni ***"Analysis of Dipole and Patch Radiators in Presence of Artificial magnetic and Impedance Reflectors and Ground Planes: Preliminary Results,"*** in Proceedings

of the Progress in Electromagnetics Research Symposium (PIERS'04), Pisa, Italy, CD Digest, March 28-31, 2004, (*invited paper*).

C38. A. Alù, and N. Engheta ***"Anomalies in the Surface Wave Propagation along Double-Negative and Single-Negative Cylindrical Shells,"*** in Proceedings of the Progress in Electromagnetics Research Symposium (PIERS'04), Pisa, Italy, CD Digest, March 28-31, 2004, (*invited paper*).

C39. L. Vegni, G. Schettini, A. Toscano, F. Bilotti, and A. Alù ***"Attività di Ricerca sull'Inquinamento Elettromagnetico Svolta dall'Unità di Roma Tre del C.I.R.I.A.F. nel Biennio 2002-2004,"*** in Proceedings of the IV Congresso Nazionale CIRIAF, Sviluppo Sostenibile Tutela dell'Ambiente e della Salute Umana, Perugia, Italy, pp. 139-151, April 2-3, 2004, (*invited paper*).

C40. N. Engheta, and A. Alù, ***"Selected Features of Metamaterials and Plasmonic Media,"*** in Proceedings of II Workshop on Microwave Engineering, Metamaterials and special materials for electromagnetic applications and TLC, Roma, Italy, p. 4, April 5, 2004, (*invited paper*).

C41. A. Alù, F. Bilotti, N. Engheta, and L. Vegni, ***"Metamaterial Monolayers and Bilayers for Enhanced Transmission through a Sub-Wavelength Aperture in a Flat Perfectly Conducting Screen,"*** in Proceedings of IX Workshop on Microwave Engineering, Metamaterials and special materials for electromagnetic applications and TLC, Roma, Italy, p. 7, April 5, 2004, (*invited paper*).

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