

Raju Mundru

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Education

2009-2014 Ph. D., Engineering

Louisiana Tech University, Ruston LA 71272

Thesis: On electromagnetic and quantum invisibility

- Optical Invisibility: Analytical and Numerical implementation of elimination of dipolar scattering from an arbitrary, thus object making the object invisible to the nearby observer.
- Zero-index low-loss Materials: As a part of optical cloaking we designed a tunable zero refractive index composite material using metallic particles and a dielectric substrate.
- Effective Medium Theory: We developed a quasi-effective medium theory that determines the optical properties of multi-layered composites beyond the quasi-static limit. The proposed theory exactly reproduces the far field scattering/extinction cross sections through an iterative process in which mode-dependent quasi-effective impedances of the composite system are introduced.
- Repulsive Casimir Force: We obtained a sufficient condition that can serve as a useful tool in designing quantum levitating systems with air as the intermediate medium, which is the natural environment for practical microscopic devices.

2008-2014 M.Sc., Electrical Engineering

Louisiana Tech University, Ruston LA 71272

Practicum: Analytical and numerical analysis of a generic cloaking system

- We obtained a specific geometrical and material properties for the shells around the object, we were able to achieve a transparency conditions independent of object's optical properties in quasi-static regime. A complete suppression of dipolar scattering is demonstrated for an arbitrary object enclosed in such a system.

2003-2007 B. Tech., Electronics and Communication Engineering

Jawaharlal Nehru Technological University, Hyderabad AP 500085

Project: Multiplierless FIR Filter Design

Research Interests

- Electromagnetic properties of nano-structured complex media including: metal composites, rough surfaces, fractal aggregates, and ordered media
- Optical and Quantum scattering, Nanophotonics and quantum optics, nonlinear optics and spectroscopy, quantum dots, nanoscopic lasers and optical elements
- Artificial materials: metamaterials and negative index media, electric and magnetic plasmons, electromagnetic cloaking

Teaching Experience

2017-pre

Assistant Professor
Point Park University, Pittsburgh PA 15212

- ET 204 Programming for Engineering Technology
- EET 305 Communication Electronics & Lab
- PHYS 101 Physics I & Lab

2016-2017

Assistant Professor
Eastern New Mexico University, Portales NM 88130

- EET 241 & 241L Logic Circuits and Lab
- EET 340 Computer Organization and Architecture
- EET 472 & 472L Microprocessor and Microcontroller Interfacing and Lab
- EET 490 Capstone
- EET 242 & 242L Sequential Circuits and Applications
- EET 342 Advanced Computer Organization and Architecture

2015-2016

Visiting Lecturer
Louisiana Tech University, Ruston LA 71272

- PHYS 201 Physics for Engineers & Scientists I
- ELET 260 Electronic Circuit Theory I
- ELET 272 Electronic Circuit Theory II
- ELET 270 Instrumentation
- ELET 170 Electrical Networks I
- ELET 180 Electrical Networks II
- ELET 460 Digital Data Communication and Networks

2014-2015

Adjunct Lecturer
Louisiana Tech University, Ruston LA 71272

- PHYS 201 Physics for Engineers & Scientists I
- PHYS 202 Physics for Engineers & Scientists II

2014-2015

Teaching Assistant
Louisiana Tech University, Ruston LA 71272

- PHYS 205 Conceptual Physics
- PHYS 261 & 262 General Physics Lab I & II
- ELEN 472 Introduction to Digital Control Systems (Grading)

2007-2008 **Lecturer**
Jawaharlal Nehru Technological University, Hyderabad AP 500085

- Electromagnetic theory & Transmission lines
- Microprocessors and interfacing(Intel 8086)
- Electronic Devices and Circuits lab
- Very High Speed Integrated Circuit Hardware Description language(VHDL)

Awards

- 2014 **Highlights of 2014.** Our paper “Quasi-effective medium theory for multilayered magneto-dielectric structures” , was selected by the editors for inclusion in the exclusive ‘Highlights of 2014’ research collection because of its novelty, scientific impact and broadness of appeal.
- 2014 **Journal Cover.** Our paper “Quasi-effective medium theory for multilayered magneto-dielectric structures” , was featured on the cover of Journal of Optics.
- 2012 **Editors’ Suggestion.** Our paper “Material- and geometry-independent multi-shell cloaking device, has been selected by the editors of Physical Review B to be an Editors’ Suggestion.
- 2012 **Travel grant.** SPIE Optics+Photonics 2012 graduate student travel grant.
- 2011 **LONI Graduate Fellowship.** Louisiana Optical Network Initiative (LONI). The award recognizes the top 3 scoring research proposals from all branches of computational sciences.
- 2010 **Travel grant.** Travel grant form South Eastern American Physical Society Meetings, Louisiana State University, Baton Rouge, LA.

Professional Activities

- The International Society for Optics and Photonics (SPIE)
- Optical Society of America (OSA)
- American Physical Society (APS)
- Institute of Electrical and Electronics Engineers (IEEE)
- Reviewer for Journal of Optics (JOPT)

Curriculum Development

- 2016 Developed power systems and advanced digital circuits courses for Electronics Engineering and Technology program at Eastern New Mexico University, Spring 2016
- 2016 Developed computer organization, microcontrollers & interfacing and digital circuits courses for Electronics Engineering and Technology program at Eastern New Mexico University, Fall 2016
- 2015 Developed semiconductor devices and circuits I & II for Electrical Engineering and Technology program at Louisiana Tech University, Fall & Spring 2015-2016

Service

- **Judge** for Southeastern New Mexico Regional Student Research Challenge, 4 march 2017
- **Faculty representative** for EET program at the ENMU's Green & Silver Day hosting high school seniors, 4 November 2016
- **Faculty representative** for EET program at the ENMU's College EXPO hosting freshmen and Sophomores, 5 October 2016
- **Reviewer** Journal of Optics

Publications

- V. Pappakrishnan, P. C. Mundru, D. A. Genov, "Repulsive Casimir force in magnetodielectric plate configurations," *Phys. Rev. B*, 045430 (2014).
- D. A. Genov and P.C. Mundru, "Quasi-effective medium theory for multilayered magneto-dielectric structures," *J. Opt.* 16, 015101 (2014). (featured on the **cover** of the magazine)
- P. C. Mundru, V. Pappakrishnan and D. A. Genov, "Material- and geometry-independent multishell cloaking device," *Phys. Rev. B* 85, 045402 (2012). (selected by the editors of the journal to be Editors' Suggestion)
- P. C. Mundru (Poster Presentation), V. Pappakrishnan and D. A. Genov, "Generic Cloaking Device," *SPIE Optics+Photonics 2012*, San Diego, CA (August, 12-16, 2012).
- P. C. Mundru (Poster Presentation), V. Pappakrishnan and D. A. Genov, "Multishell Generic Cloaking Device," *The 2012 Mardi Gras Conference Computational Materials and Biosystems*, Louisiana State University, Baton Rouge, LA (February 16-18, 2012).
- V. Pappakrishnan (Poster Presentation), P. C. Mundru and D. A. Genov, "Casmir force reversal using metamaterials," *The 2012 Mardi Gras Conference Computational Materials and Biosystems*, Louisiana State University, Baton Rouge, LA (February 16-18, 2012).
- P. C. Mundru (Presenter) and D. A. Genov, "Analytical and Numerical analysis of a Generic Cloaking Device," *March Meeting of The American Physical Society (APS)*, Dallas, TX (March 24, 2011).
- P. C. Mundru (Presenter) and D. A. Genov, "Mathematical Theory and Design of a Generic Cloaking Device," *Louisiana Academy of Sciences 85th Annual Meeting*, Monroe, LA (Feb 26, 2011).