

# Camille CARVALHO

Applied Maths Unit, 5200 N. Lake Rd, 95348 Merced CA

carvalho0camille@gmail.com

<http://carvalhocamille.github.io/index.html>

## CURRENT POSITION

**Visiting Assistant Professor at University of California Merced, CA**

**07/2016-**

Research on boundary integral methods to compute near electromagnetic fields in plasmonic structures (work with A.D. Kim and S. Khatri).

Lecturer for Vector Calculus at University of California Merced.

## EDUCATION

**Post-doc at CMAP École Polytechnique, team DEFI, France (METAMATH grant)**

**02/16-06/16**

Numerical investigation of interior transmission eigenvalues (work with L. Chesnel and H. Haddar).

**PhD in Applied Mathematics at École Nationale de Techniques Avancées (ENSTA), France**

**2012-2015**

Title : Mathematical and numerical study of plasmonic structures with corners.

Laboratory: Unité de Mathématiques Appliquées (UMA) of ENSTA, team POems, Palaiseau, France.

PhD advisors: A.-S. Bonnet-Ben Dhia, P. Ciarlet Jr.

**Master Degree of Applied Mathematics at Université Pierre et Marie Curie (UMPC), France**

**2011-2012**

Partial Differential Equations and Numerical Analysis. Master with honors.

**Engineer School ENSTA ParisTech, France**

**2009-2012**

Engineer diploma with mathematical engineering education.

## HONORS AND AWARDS

**DGA** (Direction Générale de l'Armement) Ph.D fellowship, France

**2012-2015**

**ENSTA ParisTech** Ph.D fellowship, ENSTA, France

**2012-2015**

## TEACHING EXPERIENCE

**Lecturer at University of California Merced**

**07/2016-**

Vector Calculus (second year) for Fall 2016.

**Teaching Assignments at ENSTA**

**02/16-06/16**

Quadratic optimization (10h).

**Teaching Assignments at ENSTA**

**2012-2015**

Quadratic optimization (3x15h), Stability and control of dynamic systems (2x15h), Complex analysis (3x15h), (occasionally Finite Elements Method (4h) and Discretization of PDE's (4h)), Tutoring activity for students with difficulties in applied mathematics.

## SKILLS

### Languages

French: mother tongue

English: fluent

Spanish: basic

Japanese: good knowledge

### Computer skills

Windows, Linux, Mac OS

Programming: C, C++, FORTRAN, Git, Matlab, Maple, FreeFem++, LaTeX

Infographics: Inkscape, Adobe Photoshop

## RESEARCH ACTIVITIES

### Research interests

Partial Differential Equations, Waves propagation, Electromagnetism, Scattering, Metamaterials and Plasmonics, Modelling, Numerical Analysis, Simulation and Scientific Computing, Finite Elements Method, Spectral theory, waveguides, PMLs, Kondratiev theory, Singularities, Boundary integral methods, Asymptotics

## PUBLICATIONS

### Journal Publications

- [1] A.-S. Bonnet-Ben Dhia, C. Carvalho, L. Chesnel, P. Ciarlet Jr., «Plasmonic cavity modes: black-hole phenomena captured by Perfectly Matched Layers», PROCEEDING of PIERS 2013 in Stockholm, p. 638-642, **2013**.
- [2] A.-S. Bonnet-Ben Dhia, C. Carvalho, L. Chesnel, P. Ciarlet Jr., «On the use of Perfectly Matched Layers at corners for scattering problems with sign-changing coefficients», Journal of Computational Physics, vol. 322, 224-247, **2016**.
- [3] A.-S. Bonnet-Ben Dhia, C. Carvalho, P. Ciarlet Jr., «Mesh requirements for the finite element approximation of problems with sign-changing coefficients», **submitted**.
- [4] C. Carvalho, L. Chesnel, P. Ciarlet Jr., «Eigenvalue problems with sign-changing coefficients», **submitted**.
- [5] A.-S. Bonnet-Ben Dhia, C. Carvalho, P. Ciarlet Jr., «T-coercivity for plasmonic waveguides», **in preparation**.
- [6] C. Carvalho, S. Khatri, A.D. Kim, «Local analysis for close evaluation for layer potentials», **in preparation**.

### Refereed conference proceedings

- [7] A.-S. Bonnet-Ben Dhia, C. Carvalho, L. Chesnel, P. Ciarlet Jr., X. Claeys, S.A. Nazarov, «Negative materials and corners in electromagnetism», Report No.3/2013 of Mathematisches Forschungsinstitut Oberwolfach" Computational Electromagnetism and Acoustics", Oberwolfach, **2013**.
- [8] A.-S. Bonnet-Ben Dhia, C. Carvalho, L. Chesnel, P. Ciarlet Jr., X. Claeys, «Plasmonic cavity modes with sign changing permittivity», WAVES, Tunis, Tunisia, **2013**.
- [9] A.-S. Bonnet-Ben Dhia, C. Carvalho, L. Chesnel, P. Ciarlet Jr., «Plasmonic cavity modes: black-hole phenomena captured by Perfectly Matched Layers», PIERS, Stockholm, Sweden, **2013**.
- [10] A.-S. Bonnet-Ben Dhia, C. Carvalho, P. Ciarlet Jr., «Plasmonic waveguides: T-coercivity approach for Maxwell's equations», WAVES, Karlsruhe, Germany, **2015**.
- [11] A.-S. Bonnet-Ben Dhia, C. Carvalho, C. Chambeyron, L. Chesnel, P. Ciarlet Jr., A. Nicolet, F. Zolla, «Curious energy losses at corners of metallic inclusions», WAVES, Karlsruhe, Germany, **2015**.

### Other publications

- [12] C. Carvalho, «Etude mathématique et numérique de structures plasmoniques avec coins», Ph.D dissertation, Ecole Polytechnique, **2015**.

## COMMUNICATIONS

### International conferences

- «Plasmonic waveguides: T-coercivity approach for Maxwell's equations», WAVES, Karlsruhe, **2015**.
- «Leaky modes in a closed plasmonic waveguide», Leaky Days, Palaiseau, France, **2015**.
- «Leaky modes in a non dissipative plasmonic waveguide with a bounded cross section», OWTNM, Nice, France, **2014**.
- «Revealing guides modes in a plasmonic waveguide using Perfectly Matched Layers at the corners», KOZ-Waves, Newcastle, Australia, **2014**.
- «Plasmonic cavity modes: black-hole phenomena captured by Perfectly Matched Layers», PIERS, Stockholm, Sweden, **2013**.
- «Plasmonic cavity modes with sign changing permittivity», WAVES, Tunis, Tunisia, **2013**.

### Invited talks

- «Mathematical and numerical study of plasmonic structures with corners», UC Merced, CA, **2016**.
- «Mesh requirements for transmission problems with sign-changing coefficients», University of Reims, **2015**.
- «Leaky modes in a closed plasmonic waveguide», Leaky Days, Palaiseau, France, **2015**.
- «Fredholm theory and T-coercivity», ENSTA, Palaiseau, **2014**.

## **MENTORING OF STUDENTS**

**Mentor for first-year students at ENSTA**

**2012-2015**

Approximately 15 students each year.

## **SERVICES/ACTIVITIES**

**Volunteer for W-STEM at University of California of Merced**

**2016-**

**Organizer of the social events for the Applied Maths Unit of ENSTA**

**2012-2015**

**Volunteer for the Applied Maths Unit of ENSTA at the Science festival**

**2013-2014**

**President of the “Arts en Scène” association**

**2009-2010**

Organization of the ParisTech artistic festival (over 600 participants).