

# MARÍA–LUISA RAPÚN

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## 1. Personal data

Name: Rapún, María–Luisa

Born: 02/28/1977, Huesca (Spain)

Affiliation and address: Assistant professor

Dpto. Fundamentos Matemáticos, E.T.S.I. Aeronáuticos, U. Politécnica de Madrid,  
Plaza Cardenal Cisneros 3, 28040 Madrid (Spain)

E-mail: [marialuisa.rapun@upm.es](mailto:marialuisa.rapun@upm.es)

## 2. Research interests

Defect detection in solids

Boundary element methods and their applications

Scattering of acoustic and thermal waves

## 3. Education

Mathematics, especiality Applied Mathematics, U. de Zaragoza, 2000

D.E.A., especiality Computational Mechanics, U. de Zaragoza, 2002

Ph.D in Applied Mathematics, U. de Zaragoza, 2004. Thesis: Numerical methods for the study of the scattering of thermal waves. Advisor: F.J. Sayas

## 4. Employment

Assistant professor, Dpto. Matemática Aplicada, U. de Zaragoza. Nov. 2000 to Feb. 2001

Assistant professor, Dpto. Matemática e Informática, U. Pública de Navarra. Oct. 2002 to Sep. 2005

Assistant professor, Dpto. Matemática Aplicada (Biomatemática), U. Complutense de Madrid. Oct. 2005 to Sep. 2006

Assistant professor, Dpto. Fundamentos Matemáticos de la Tecnología Aeronáutica, U. Politécnica de Madrid. Oct. 2006 onwards

## 5. Publications

### Books

V. Domínguez and M.L. Rapún, *Matlab en cinco lecciones de Numérico* (Matlab in five lessons of Numerical Analysis). Universidad Pública de Navarra Eds., 2007. ISBN 978-84-9769-195-6.

### Chapters of books

A. Carpio and M.L. Rapún, *Topological derivatives for shape reconstruction* (50 pages). In: Inverse Problems and Imaging, Lecture Notes in Mathematics 1943, Springer 2008, pp 85–133.

### Papers in referred journals

M.L. Rapún and F.J. Sayas, *Boundary integral approximation of a heat-diffusion problem in time-harmonic regime*. Numer. Algorithms 2006 (41) 127–160

M.L. Rapún and F.J. Sayas, *A mixed-FEM and BEM coupling for the approximation of the scattering of thermal waves in locally non-homogeneous media*. ESAIM: M2AN Math. Model. Numer. Anal. 2006 (40) 871–896

M.L. Rapún and F.J. Sayas, *Boundary element simulation of thermal waves*. Arch. Comput. Methods Eng. 2007 (14) 3–46

T. Hohage, M.L. Rapún and F.J. Sayas, *Detecting corrosion using thermal measurements*. Inverse Problems 2007 (23) 53–72

V. Domínguez, M.L. Rapún and F.J. Sayas, *Dirac delta methods for Helmholtz transmission problems*. Adv. Comput. Math. 2008 (28) 119–139

M.L. Rapún and F.J. Sayas, *Mixed boundary integral methods for Helmholtz transmission problems*. J. Comput. Appl. Math. 2008 (214) 238–258

A. Carpio and M.L. Rapún, *Solving inhomogeneous inverse problems by topological derivative methods*. Inverse Problems 2008 (4). Article number 045014 (34 pages)

A. Carpio and M.L. Rapún, *Domain reconstruction using photothermal techniques*. Journal of Computational Physics 2008 (17) 8083–8106

A. Laliena, M.L. Rapún and F.J. Sayas, *Symmetric boundary integral formulations for Helmholtz transmission problems*. To appear in Journal of Applied Numerical Mathematics 2009, DOI: 10.1016/j.apnum.2008.12.030

## Papers in conference proceedings

- R. Celorrio, M.L. Rapún and F.J. Sayas, *An integral method for exterior transmission problems with application to scattering of thermal waves* VII Zaragoza-Pau conference on Applied Mathematics. Monografías seminario matemático García Galdeno, 2003 (27) 193–200
- R. Celorrio, M.L. Rapún and F.J. Sayas, *A boundary element model with nearby neighbours for the study of the scattering of thermal waves*. J.M. Goicolea, C. Mota Soares, M. Pastor, G. Bugada (eds.): V Conference on Numerical Methods in Engineering Métodos Numéricos en Ingeniería, SEMNI 2002 (electronic)
- V. Domínguez, M.L. Rapún and F.J. Sayas *Quadrature methods for integral systems of equations in the study of transmission problems*. J.M. Jornet, J.M. López, C. Olivé, R. Ramírez, eds. Proceedings of XVIII CEDYA/VIII CMA, 2003 (electronic)
- R. Celorrio, M.L. Rapún and F.J. Sayas, *A mixed boundary element method applied to scattering of thermal waves in composite materials* 7th International Conference on Integral Methods in Science and Engineering, Birkhäuser–Boston, Boston MA, 2004, 31–36
- T. Hohage, M.L. Rapún, F.J. Sayas and M.L. Sein–Echaluze, *Parameter determination in diffusive media via thermal waves*. Proceedings of Waves 2005, 299–300
- M.L. Rapún and F.J. Sayas, *A direct boundary integral formulation and its discretization for Helmholtz transmission problems*. XIX CEDYA/IX CMA, 2005 (electronic version)
- M.L. Rapún and F.J. Sayas, *Indirect methods with Brakhage–Werner potentials for Helmholtz transmission problems*. ENUMATH 2005. Springer 2006, 1146–1154
- M.L. Rapún and F.J. Sayas, *Exterior Dirichlet and Neumann problems for the Helmholtz equation as limits of transmission problems*. 8th International Conference on Integral Methods in Science and Engineering, Birkhäuser–Boston, Boston MA, 2008, 207–216
- A. Carpio and M.L. Rapún, *Topological derivative based methods for non-destructive testing*. ENUMATH 2007, Springer 2008, 687–694.

## 6. Recent communications at scientific meetings

- A. Laliena, M.L. Rapún and F.J. Sayas, *Symmetric boundary integral formulations in the study of Helmholtz transmission problems*. Boundary Elements–Theory and Applications (BETA 2007). Hannover, Germany. May 2007
- A. Carpio and M.L. Rapún, *Topological derivatives for shape reconstruction*. I Congreso Hispano–Francés de Matemáticas. Zaragoza, Spain. July 2007
- A. Carpio and M.L. Rapún, *Topological derivatives for non-homogeneous inverse problems*. ENUMATH 2007. Graz, Austria. September 2007
- A. Laliena, M.L. Rapún and F.J. Sayas, *Symmetric boundary element methods for Helmholtz transmission problems*. XX CEDYA/ X CMA. Sevilla, Spain. September 2007

- A. Carpio and M.L. Rapún, *A topological derivative based method for parameter identification and shape reconstruction*. Inverse Problems: Modelling and Simulation (IPMS 2008). Fethiye, Turkey. May 2008
- A. Carpio and M.L. Rapún, *A new topological derivative based scheme for shape and parameter reconstruction*. International conference on inverse problems honoring D. Colton and R. Kress. Sestri-Levante, Italy 2008