



KATHERINE CASTRO DÍAZ  
*Department of Geometry and Topology  
University of Granada  
Faculty of Science  
Granada, Spain*

## Contact Info

---

Locaion: University of Granada, Granada-Spain, Faculty of Science, office 4, ground floor.  
Address: Campus Fuentenueva S/N.  
CP: 18071.  
E-mails: *ktcastro@ugr.es, katycadi@gmail.com*  
Telephone: (+34) 958241000 (ext. 20041)

## Education

---

- 2011 UNIVERSITY OF GRANADA, SPAIN.  
*PhD student in Physics and Mathematics, 2015.*  
*Advisors: Manuel María Ritoré Cortés and Manuel César Rosales Lombardo.*  
*Isoperimetric Inequalities on Metric Measure Spaces.*
- 2009 UNIVERSITY OF GRANADA, SPAIN.  
*Master of Science in Mathematics, December 2010.*  
*Advisor: Antonio Ros Mulero.*  
*Hipersuperficies mínimas y de curvatura media constante con frontera libre (Minimal and constant mean curvature hypersurfaces with free boundary).*
- 2003 UNIVERSITY OF VALLE, COLOMBIA.  
*Bachelor of Science in Mathematics, April 2009.*  
*Advisor: Gonzalo García Camacho.*  
*El primer valor propio no cero del problema de Steklov (The first non-zero eigenvalue of Steklov Problem).*

## Awards and Scholarships

---

- 2011 Training of research staff program fellow, PhD student in Physics and Mathematics, Ministry of Science and Innovation, Government of Spain.
- 2010 With honors (Outstanding Thesis), Master of Science in Mathematics, University of Granada, Spain.
- 2009 With honors (Magna Cum Lauden Thesis), Bachelor of Science in Mathematics, University of Valle, Colombia.

## Research Interests

---

- Riemannian Manifolds.  
Minimal Surfaces.  
Constant Mean Curvature.  
Manifolds With Density.  
Isoperimetric Problems.

## Publications

---

- Accepted Katherine Castro and César Rosales, Free boundary stable hypersurfaces in manifolds with density and rigidity results, *Journal of Geometry and Physics*, 2014.
- Preprint K. Castro, M. Ritoré and C. Rosales, *Stable constant mean curvature surfaces with density that minimize area*, 2012.

## Attending Events

---

- 2013 Segundo Congreso de Jóvenes Investigadores RSME, Sevilla, September.
- 2013 Geometric Measure Theory and Optimal Transport, Trieste, July-August.
- 2012 Lectures on Stable Minimal Surfaces, Granada, September.
- 2012 Superficies Propiamente Embebidas de Curvatura Media Constante en  $\mathbb{R}^3$ , Granada, September.
- 2012 Geometry of Minimal Surfaces Via Integrable Systems, Granada, September.

- 2012      Geometry Variational Problems, Granada, June.
- 2012      CMC and Minimal Surfaces, Granada, May.
- 2012      Workshop on the Willmore Conjecture, Granada, May.
- 2012      Investidura Doctor Honoris Causa del Prof. Manfredo P. Do Carmo, Murcia, May.
- 2011      Jornada de Geometría, Granada, December.
- 2011      2nd European Young and Mobile Workshop: Geometric Analysis and Partial Differential Equations, Granada, November.
- 2011      VI International Meeting on Lorentzian Geometry, Granada 2011, Granada, September.
- 2011      International Conference on Surface Theory, Sevilla, April.
- 2011      Doc-Course Submanifold Theory and Applications, Sevilla, March-April.
- 2011      Spanish-Japanese Workshop on Differential Geometry, Granada, February.
- 2009      XVII Congreso Colombiano de Matemáticas CCM2009, Cali, August.
- 2008      Taller de Teoría de Juegos, Bogotá, February.
- 2007      Seventh American School in Differential Equations and Nonlinear Analysis, Cartagena de Indias, July.
- 2006      EMALCA Colombia, Primera Escuela Colombiana de Matemáticas, Socorro, October.
- 2006      XII Escuela Regional de Matemáticas, Pereira, September.
- 2006      International Conference in Memory of José Escobar "Chepe", Santiago de Cali, January.
- 2005      XI Escuela Regional de Matemáticas, Santiago de Cali, June.
- 2004      Cita de Enero en Ecuaciones Diferenciales, Santiago de Cali, January 2004.

### **Computer skills**

---

- OS      Expert user of Linux, advanced user Windows.
- Tools    Extensive experience using and programming Mathematica, MatLab, MuPad, Python.

### **Language skills**

---

- Spanish    Native speaker.
- English    Good ability to read and listen.

### **Training in differential geometry and differential equations**

---

- Univalle    [Differential Equations.](#)
- Univalle    [Curves and Surfaces.](#)
- Univalle    Partial Differential Equations on the following page.
- Univalle    [Operator, Semigroups and Differential Equations.](#)
- Univalle    [Differential Geometry.](#)
- Univalle    [Modern Geometry.](#)
- UGR            [Simple Geometry Problems with Applications to Physics.](#)
- UGR            [Geometric Properties of the Surfaces of Separation Between Fluids.](#)
- UGR            [Minimal Surfaces and Geometric Variational Problems.](#)
- UGR            [Calculus of Variations and Optimization.](#)
- UGR            [Geometry of Relativistic Space-Times.](#)
- UGR            [Symmetries and Lie Groups in Mathematical Physics.](#)

### **Teaching positions performed**

---

- 2011        University of Granada, Granada-Spain, fellow FPI, September 2015.
- 2004        University of Valle, Santiago de Cali-Colombia, assistant professor, July 2009.
- 2003        Javeriana Pontifical University, Santiago de Cali-Colombia, assistant professor, June 2004.

1

*Vicente Diaz 10/2020  
Universidad del Valle  
Departamento de Matemáticas  
FACULTAD DE CIENCIAS*

**UNIVERSIDAD DEL VALLE  
FACULTAD DE CIENCIAS  
DEPARTAMENTO DE MATEMATICAS<sup>1</sup>  
PROGRAMAS  
(EDP)**

**Ecuaciones Diferenciales Parciales (111183) (Posgrado)**

**1. La Ecuación de Laplace.**

(a) Separación de variables. Las funciones de Bessel, Legendre, Expansión de Fourier.	(2 semanas)
(b) Soluciones elementales. Simetría. Teorema de Inversión de Kelvin.	(1 semana)
(c) La Función de Green. Problemas de Frontera.	(2 semanas)
(d) Problemas en dos Dimensiones. La Potencia Logarítmica. Transformaciones Conformes.	(1 semana)

**2. La Ecuación de Ondas.**

(a) Soluciones Elementales. El Método Riemann–Volterra.	(2 semanas)
(b) Separación de variables. Funciones esféricas de Bessel.	(2 semanas)
(c) La solución general y la Función de Green	(1 semana)

**3. La Ecuación de Difusión.**

(a) Problemas de Frontera y el Teorema de Duhamel.	(1 semana)
(b) Soluciones elementales. Separación de Variables.	(2 semanas)
(c) Las Transformaciones Integrales.	(1 semana)
(d) La Función de Green y Fuentes.	(1 semana)

**4. Teoría de Sobolev. Teorema de Inyección. Desigualdades de Sobolev. Aplicaciones a las Ecuaciones Elípticas.**

**Bibliografía**

1 R. V. CHURCHILL: Fourier Series and Boundary Value Problems (Mc Graw Hill, New York, 1941).

2 J. C. JAEGER: Conduction of Heat in Solids (Oxford, New York, 1947).

3 C. A. COULSON: Waves (Oliver & Boyd, Edinburgh, 1941).

4 IAN N. SNEDDON: Special Functions of Mathematical Physics and Chemistry. (Oliver & Boyd, Edinburgh, 1961).

5 ARNOLD. Partial Diff. Equations.

<sup>1</sup>Esta es una publicación del Departamento de Matemáticas de la Universidad del Valle, A.A. 25360, Cali, Colombia.

Figure 1: EDP program