

Ma. Fernanda Espinal

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Colombian Citizenship

PhD Candidate in Mathematics

Mathematical Interest

My main area of research is geometric analysis. I am interested in the study of problems in elliptic/parabolic nonlinear equations arising from conformal geometry. I am particularly interested in conformal invariance, Yamabe-type flows, conformal deformation of curvature functions and analysis of singularities on Riemannian manifolds.

Employment and education

- 2019 - 2024 **PhD in Mathematics**, Pontificia Universidad Católica de Chile.
Advisor: Mariel Sáez. Co-advisor: María Del Mar González (UAM)
- 2015 - 2018 **Lecturer in Mathematics**, Universidad del Valle, Colombia.
- 2013 - 2016 **M.Sc. in Mathematics**, Universidad del Valle, Colombia.
Advisor: Gonzalo García
- 2007 - 2013 **B.Sc. in Mathematics**, Universidad del Valle.
Advisor: Heber Mesa

Publications

Preprints

- [1] M.d.M. González, M. F. Espinal and L. Mazziere. *A gluing construction of singular solutions for a fully non-linear equation in conformal geometry.* arXiv:2404.05965

Thesis

- [1] M. F. Espinal. *Conformal Invariance and Yamabe-Type Flows.* Pontificia Universidad Católica de Chile PhD Thesis, expected for May 2024.
- [2] M. F. Espinal. *Conformal deformation of metrics over a manifold with two connected components boundary* (in spanish). Universidad del Valle M.Sc. Thesis, January 2016.
- [3] M. F. Espinal. *Skew loops and quadric surfaces* (in spanish). Universidad del Valle B.Sc. Thesis, April 2013.

Work in progress

- [2] M. F. Espinal and M. Sáez *On the existence and classification of k -Yamabe solitons.* In final preparation.

Organization of seminars and conferences

- 10.05.23 - **WoMaths**: "Congreso Mujeres Matemáticas". Pontificia Universidad Católica de Chile, Universidad de Chile and Universidad de Santiago de Chile, Chile.

Research Stays

- 05.10.22 - **Universidad Autónoma de Madrid**, Madrid, Spain. Visiting Prof. Maria del Mar González.
03.05.23

Talks and Posters

- 08/2024 **CLAM, Brasil**, VII Congreso Latinoamericano y del Caribe de Matemática 2024.
Existence and Classification of k -Yamabe Gradient Solitons.
- 12/2023 **Universidad de Chile, Chile**, Encuentro SOMACHI 2023.
On The existence and Classification of k -Yamabe Gradient Solitons.
- 10/2023 **Pontificia Universidad Católica de Chile, Chile**, Seminario de Análisis y Geometría.
Constant σ_2 -curvature metrics with non isolated singularities
- 10/2023 **Universidad de Chile, Chile**, Seminario de EDPs.
A gluing construction of singular solutions for a fully non-linear equation in conformal geometry
- 06/2023 **Pontificia Universidad Católica de Chile, Chile**, Seminario de Estudiantes de Postgrado.
Singular k -Yamabe Problem
- 02/2023 **Universidad Autónoma de Madrid, España**, Seminario de Estudiantes Coloquio Junior.
Una introducción al σ_k -Problema de Yamabe
- 06/2022 **Universidad de Chile, Chile**, Seminario de Estudiantes de Postgrado.
Geometric Flows and k -Yamabe Problem
- 06/2022 **Universidad Técnica Federico Santa María, Chile**, Seminario de Geometría Diferencial.
Geometry and Topology
- 01/2021 **Universidad del Valle, Colombia**, Seminario de egresados Convimate.
Conformal Invariance and Yamabe-Type Flows
- 12/2016 **Universidad del Valle, Colombia**, Seminario de egresados de Matemáticas Convimate.
Problema de Yamabe: Desarrollo Histórico
- 07/2011 **Universidad Industrial de Santander, Colombia**, Congreso Colombiano de Matemáticas.
Skew Loops and Quadric Surfaces

Seminars, Conferences and Research Schools Attended

- 2023 **Coloquio Brasileiro de Matemáticas**. Instituto Nacional de Matemática Pura y Aplicada IMPA. Rio de Janeiro, Brazil.
- 2023 **Mini Workshop organized by professor Detang Zhou**. Universidade Federal Fluminense. Niteroi, Brazil.
- 2022-2023 **Seminario de Análisis y Geometría**. Pontificia Universidad Católica de Chile. Santiago, Chile
- 2022 **Nonlocal PDEs and Applications** . Universidad de Granada. Granada, Spain.
- 2022 **Seminario EDP UAM-ICMAT** . Universidad Autónoma de Madrid. Madrid, Spain.
- 2021 **Young Geometers Meeting** . University of Copenhagen. Online conference. Denmark.
- 2021 **Geometric Analysis Seminar**. Pontificia Universidad Católica de Chile. Online meeting.

Teaching

- 2024-1 **Geometry I, Construcción Civil**, 48h in total [español], **Matemática Básica**, PACE Program [español], Pontificia Universidad Católica de Chile.
- 2024-1 **Álgebra e Introducción al Cálculo, Escuela de Ingeniería**, [español], Universidad de los Andes, Chile.
- 2023-2 **Geometry I, Construcción Civil**, 48h in total [español], Pontificia Universidad Católica de Chile.
- 2022-1 **Precálculo, College UC**, 48h in total [español], Pontificia Universidad Católica de Chile.

2016-2018 **Cálculo I, Cálculo II, Cálculo Avanzado, Álgebra Lineal, Ecuaciones Diferenciales Ordinarias, Matemática Fundamental**, *School of Engineering and School of Economic Sciences*. Universidad del Valle, Colombia.

2017 **Precálculo**, *Coordinator and instructor of the pre-calculus course offered to students admitted to the university in programs within the School of Engineering*. Universidad del Valle, Colombia.

Teaching Assistance

2013-2015 **Cálculo I, Álgebra Lineal, Cálculo Avanzado**, *Prof. Martha Pinzón, Daniela Vásquez, Ana Maria Sanabria y Doris Hinestroza*, 96h in total each course [español], Mathematical training courses School of Engineering. Universidad del Valle, Colombia.

Awards and honors

2007 - 2011 **Pregrado en Matemáticas**, *Estímulos académicos semestrales primeros cinco puestos*, Universidad del Valle, Colombia.

Outreach and others

2023 **Ada Lovelace Day. Jornada Latinoamericana de Talleres STEM para niñas y mujeres adolescentes** . Pontificia Universidad Católica de Chile. Santiago, Chile.

2018 **Semillero de Matemáticas**, *Teaching across various modules aimed at students in basic and secondary education, with the aim of strengthening civic values and fostering an interest and passion for mathematics..* Universidad del Valle, Colombia.

2017 **Objetos Virtuales de Aprendizaje - OVA**, *Assistance in the design and development of a pedagogical tool for enhancing quantitative reasoning skills using cutting-edge technologies. Dirección de Nuevas Tecnologías y Educación Virtual - DINTEV y Centro de Innovación Educativa Regional-Sur (CIER-Sur)*. Universidad del Valle. Colombia

2013-2018 **Olimpiadas Regionales de Matemáticas ORM**, *Involvement in the promotion and teaching of mathematical Olympiad workshops for students and teachers from schools in the southwestern region of Colombia*. Universidad del Valle. Colombia