1. Record Nr. UNINA9910754090703321 Autore Alarcón Antonio **Titolo** New Trends in Geometric Analysis: Spanish Network of Geometric Analysis 2007-2021 / / edited by Antonio Alarcón, Vicente Palmer, César Rosales Cham:,: Springer Nature Switzerland:,: Imprint: Springer,, 2023 Pubbl/distr/stampa **ISBN** 3-031-39916-1 Edizione [1st ed. 2023.] Descrizione fisica 1 online resource (398 pages) Collana RSME Springer Series, , 2509-8896 ; ; 10 Altri autori (Persone) **PalmerVicente** RosalesCésar Disciplina 515.1 Soggetti Geometry Mathematical analysis **Analysis** Geometria analítica Llibres electrònics Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Nota di contenuto Intro -- Preface -- Contents -- Snapshots of Non-local Constrained Mean Curvature-Type Flows -- 1 Non-local Versus Unconstrained Mean Curvature Flow -- 1.1 The Classical Mean Curvature Flow -- 1.2 The Volume-Preserving Version of the Flow -- 2 The Area-Preserving Curve Shortening Flow -- 2.1 Evolution of Convex Curves -- 2.2 Basic Features for the Flow of Embedded Curves -- 2.3 Towards a Grayson-Type Theorem -- 2.4 Further Results -- 3 Volume-Preserving Mean Curvature-Type Flows -- 3.1 Convex Evolution and Stability Results --3.2 Free Boundary Problems with Rotational Symmetry -- 3.3 Evolution with Speeds Different from the Mean Curvature -- 3.4 Applications --References -- Spherical Curves Whose Curvature Depends on Distanceto a Great Circle -- 1 Introduction -- 2 Spherical Curves such that = (z) and the Spherical Angular Momentum -- 3 Elastic-Type

Curves on the Sphere -- 3.1 A New Characterization and a

Generalization of Elastic Curves -- 3.2 Seiffert's Spherical Spirals -- 3.3 Borderline Spherical Elastic Curves -- 4 Loxodromic-Type Curves on the Sphere -- 4.1 Case 0 < -- < -- 1 : Spherical Loxodromes --

4.2 Case =1 -- 4.3 Case > -- 1 -- 5 Spherical Catenaries -- 6 New and Classical Spherical Curves -- 6.1 Spherical Curves Such That ()=p cos2 / cos, 0< -- p< -- 1 -- 6.2 Viviani's Curve and Spherical Archimedean Spirals -- References -- Conjugate Plateau Constructions in Product Spaces -- 1 Introduction -- 2 The Geometry of E(,)-spaces -- 2.1 Geodesics -- 2.2 Isometries -- 2.3 Working in Coordinates -- 2.3.1 A Global Model for Berger Spheres -- 2.3.2 The Half-Space Model -- 2.4 Fundamental Data -- 2.5 Cylinders and Multigraphs -- 3 The Conjugate Construction -- 3.1 Conjugate Curves -- 3.1.1 Vertical and Horizontal Geodesics -- 3.1.2 The Control of the Angle Function -- 3.1.3 Completion and Embeddedness. 3.2 Some Classes of Surfaces Preserved by the Sister Correspondence -- 3.2.1 Cylinders and Multigraphs -- 3.2.2 Surfaces with Zero Abresch-Rosenberg Differential -- 3.2.3 Ruled Minimal Surfaces -- 4 Dirichlet Problems for H-Surfaces in E(,) -- 4.1 The Plateau Problem -- 4.2 The Jenkins-Serrin Problem -- 5 Compact H-Surfaces in S2()R -- 5.1 Horizontal Delaunay H-Surfaces -- 5.1.1 Construction of the Minimal Surface in M(4H2 + , H) -- 5.1.2 Analysis of the Angle Function -- 5.1.3 The Conjugate H-Immersion -- 5.1.4 Compactness -- 5.1.5 Embeddedness -- 5.2 Compact H-Surfaces of Arbitrary Genus in S2()R -- 5.2.1 Regular Tessellations -- 5.2.2 Construction of the Minimal Surface in S3B(4H2+,H) -- 5.2.3 The Conjugate H-Immersion -- 5.2.4 Embeddedness -- 5.3 Compact Minimal Surfaces in S2()S1() -- 5.3.1 Construction of the Minimal Surface in S2()R -- 5.3.2 The Conjugate Minimal Surface -- 5.3.3 Compactness -- 6 Complete H-Surfaces in H2()R -- 6.1 Genus Zero (H,k)-noids and (H,k)-nodoids in H2()R -- 6.1.1 The Construction of the Minimal Surface in E(4H2+,H) -- 6.1.2 The Conjugate H-Immersion -- 6.1.3 Embeddedness -- 6.2 Genus One Minimal k-noids in H2()R -- 6.2.1 The Minimal Surface in H2()R -- 6.2.2 The Conjugate Minimal Surface -- 6.2.3 Solving the Period Problems -- 6.2.4 Embeddedness -- 7 Numerical Examples --7.1 Evolution to the Minimal Sphere -- 7.2 Singly Periodic Minimal Surfaces in S2 R -- 7.3 Final Remarks and Future Work -- References -- Integral Geometry of Pairs of Lines and Planes -- 1 Introduction -- 2 Preliminaries -- 2.1 Support Function -- 2.2 Measure of Lines in the Plane -- 2.3 Spherical Harmonics -- 3 Lower Bounds for the Hurwitz's Deficit -- 4 Integral Formulas for the Visual Angle -- 4.1 On Crofton and Hurwitz's Formulas -- 4.2 Measure of Pairs of Lines in the Plane --4.2.1 Crofton's Formula -- 4.2.2 Masotti's Formula. 4.2.3 Powers of Sine Formula -- 5 Integral Formulas for the Dihedral Angle -- 5.1 Invariant Measures in the Set of Ordered Pairs of Planes in the Space -- 5.2 Crofton's Formula in the Space -- References --Homogeneous Hypersurfaces in Symmetric Spaces -- 1 Introduction --2 Homogeneous Hypersurfaces -- 2.1 Homogeneous Hypersurfaces and Cohomogeneity One Actions -- 2.2 Geometric Properties of Homogeneous Hypersurfaces -- 3 Symmetric Spaces -- 3.1 Definition and Fundamental Properties -- 3.2 Types of Symmetric Spaces -- 3.3 Symmetric Spaces of Noncompact Type: Root Space and Iwasawa Decompositions -- 3.4 Parabolic Subgroups and Subalgebras, and Boundary Components -- 4 Homogeneous Hypersurfaces in Compact Symmetric Spaces -- 4.1 Homogeneous Hypersurfaces of Round Spheres -- 4.2 Homogeneous Hypersurfaces in the Other Compact Symmetric Spaces -- 5 Homogeneous Hypersurfaces in Hyperbolic Spaces -- 5.1 Homogeneous Hypersurfaces in Real Hyperbolic Spaces -- 5.2 General Approach to Homogeneous Hypersurfaces in Hyperbolic Spaces -- 5.3 Homogeneous Hypersurfaces in Complex Hyperbolic Spaces -- 5.4 Homogeneous Hypersurfaces in Quaternionic Hyperbolic Spaces -- 5.5 Homogeneous Hypersurfaces in the Cayley Hyperbolic

Noncompact Type and Arbitrary Rank -- 6.1 Homogeneous Codimension One Foliations -- 6.2 Cohomogeneity One Actions with a Totally Geodesic Singular Orbit -- 6.3 Canonical Extension of Actions on Boundary Components -- 6.4 The Nilpotent Construction Method --6.5 The Classification of Cohomogeneity One Actions -- 7 Open Problems -- References -- First Dirichlet Eigenvalue and Exit Time Moments: A Survey -- 1 Introduction -- 2 Preliminaries: Poisson Hierarchy, Green Operator, Moment Spectrum, and Model Spaces -- 2.1 Poisson Hierarchy -- 2.2 Green Operator. 2.3 Radial Green Operator and Poisson Hierarchy for Geodesic Balls of Model Spaces -- 3 First Eigenvalue and Moment Spectrum -- 4 Comparison Results for the First Eigenvalue -- References -- Area-Minimizing Horizontal Graphs with Low Regularity in the Sub-Finsler Heisenberg Group H1 -- 1 Introduction -- 2 Preliminaries -- 2.1 The Heisenberg Group -- 2.2 Sub-Finsler Norms and Perimeter -- 3 The First Variation Formula and a Stationary Condition -- 4 Examples of Entire K-Perimeter-Minimizing Horizontal Graphs with One Singular Line -- 5 Area-Minimizing Cones in H1 -- References -- On the Double Soul Conjecture -- 1 Introduction -- 2 Context of Nonnegatively Curved Manifolds -- 3 Context of Double Disk Bundles -- 4 Difficulties for a Proof: Absence of Totally Geodesic Hypersurfaces and Souls -- 5 Construction of Examples as Double Disk Bundles -- 6 The Perfect Nonnegatively Curved Glued Metric and Some of Its Properties -- 7 Intertwining Results from Double Disk Bundles and Nonnegative Curvature -- 8 Proof for Biguotients -- 9 Relation to the Bott-Grove-Halperin Conjecture -- References -- Consequences and Extensions of the Brunn-Minkowski Theorem -- 1 Introduction -- 2 Deriving Grünbaum's Inequality as a Consequence of the Brunn-Minkowski Theorem -- 3 Discrete Brunn-Minkowski Type Inequalities for the Lattice Point Enumerator -- References -- An Account on Links Between Finsler and Lorentz Geometries for Riemannian Geometers --1 Introduction -- 2 A Motivating Example: Zermelo Navigation Problem -- 2.1 The Case of Mild Time-Independent Wind -- 2.1.1 Basic Finsler Setup -- 2.1.2 Classical Finslerian Solution to Zermelo Problem --2.1.3 Solution Using a Stationary Spacetime: Fermat Principle -- 2.2 The Case of Arbitrary Time-Independent Wind -- 2.2.1 Emergence of Wind Riemannian Structures -- 2.2.2 Solution Using an SSTK Spacetime. 2.3 The Time-Dependent Case -- 3 Relativistic Applications -- 3.1 Basic Lorentz Setup -- 3.2 The Initial Value Problem and Cauchy Hypersurfaces -- 3.3 Global Hyperbolicity and Causality of Spacetimes -- 3.4 Finsler Applications to Stationary Spacetimes -- 3.4.1 Background on the (Non-symmetric) Finslerian Distance dF -- 3.4.2 Finslerian Description of Causality -- 3.5 Application to General SSTK Spacetimes -- 3.5.1 The Particular Case 0 -- 3.5.2 The General Case -- 4 Finsler Applications -- 4.1 Randers-Kropina Metrics -- 4.2 Classification of Randers and Wind Riemannian Spaceforms -- 5 Interplay Finsler/Lorentz for Boundaries -- 5.1 Gromov Compactification for Incomplete Finslerian Manifolds -- 5.1.1 The Symmetric d Case -- 5.1.2 The Non-symmetric d Case -- 5.2 The Causal Boundary of a Spacetime -- 5.3 A New Busemann Boundary --5.4 The Causal Boundary of Stationary Spacetimes -- 5.4.1 The Static Case -- 5.4.2 The General Stationary Case -- 6 Lorentz-Finsler Metrics and Practical Applications -- 6.1 Anisotropic Wave Propagation and Huygens' Principle -- 6.2 Solution in Terms of Lorentz-Finsler Geodesics -- 6.3 Cut Points and Determination of the Wavefront -- 6.4

The Case of Wildfires -- References -- Geometric and Architectural

Plane -- 6 Homogeneous Hypersurfaces in Symmetric Spaces of

Aspects of the Singular Minimal Surface Equation -- 1 Physical Motivation and the Variational Problem -- 2 Cylindrical Singular Minimal Surfaces -- 3 Singular Minimal Surfaces as Minimal Surfaces in a Conformal Space -- 4 Rotational Singular Minimal Surfaces -- 5 Comparison of Rotational Tectums with Catenary Rotation Surfaces and Paraboloids -- 6 Stability Results of Plateau-Rayleigh Type -- 7 Compact Singular Minimal Surfaces with Boundary -- References -- Geometry of [,e3]-Minimal Surfaces in R3 -- 1 Introduction -- 2 The Most Symmetric Examples -- 2.1 The One-dimensional Variational Problem.

2.2 Rotationally Symmetric Solutions.

Sommario/riassunto

The aim of this book is to provide an overview of some of the progress made by the Spanish Network of Geometric Analysis (REAG, by its Spanish acronym) since its born in 2007. REAG was created with the objective of enabling the interchange of ideas and the knowledge transfer between several Spanish groups having Geometric Analysis as a common research line. This includes nine groups at Universidad Autónoma de Barcelona, Universidad Autónoma de Madrid, Universidad de Granada, Universidad Jaume I de Castellón, Universidad de Murcia, Universidad de Santiago de Compostela and Universidad de Valencia. The success of REAG has been substantiated with regular meetings and the publication of research papers obtained in collaboration between the members of different nodes. On the occasion of the 15th anniversary of REAG this book aims to collect some old and new contributions of this network to Geometric Analysis. The book consists of thirteen independent chapters, all of them authored by current members of REAG. The topics under study cover geometric flows, constant mean curvature surfaces in Riemannian and sub-Riemannian spaces, integral geometry, potential theory and Riemannian geometry, among others. Some of these chapters have been written in collaboration between members of different nodes of the network, and show the fruitfulness of the common research atmosphere provided by REAG. The rest of the chapters survey a research line or present recent progresses within a group of those forming REAG. Surveying several research lines and offering new directions in the field, the volume is addressed to researchers (including postdocs and PhD students) in Geometric Analysis in the large.