Daniel BALLESTEROS-CHÁVEZ

Personal Data

Citizenship:	Mexican.
Address:	8 Ninth Avenue. Newcastle Upon Tyne, UK. NE6 5XX.
Phone:	+44 7417427620
email:	daniel.ballesteros-chavez@durham.ac.uk
	daniel281114@gmail.com
Occupation:	PhD Student, Durham University.
Field of study:	Geometric Analysis. Differential Geometry. Nonlinear elliptic problems in Geometry.
Web:	ennaniux.github.io

Research Plan

The aim of my research is to study the existence of spacelike hypersurfaces in de Sitter space with prescribed symmetric curvature. We restrict to the case when the hypersurface is the graph of a sphere and we consider the class of corresponding functions for which the equation is also elliptic. We have obtained C^0 and C^1 a priori estimates using barrier conditions and we are currently working on the C^2 estimates by means of curvature bounds by restricting the class of prescription functions to those depending also on the slope or tilt of the hypersurface and assuming a growth rate. These estimates may be also used for a parabolic version of the problem.

We are exploring the possibility of using the same technique to get curvature bounds for hypersurfaces in anti-de Sitter space. As a generalisation of the problem described above, I am also interested in looking at graphs over compact manifolds with prescribed curvature in product spaces with indefinite metric. I would also like to study the corresponding Dirichlet problems and the boundary conditions that may be suitable for these equations.

Education

September 2019	Doctor of Philosophy in MATHEMATICS. **Durham University**. Department of Mathematical Sciences. Thesis: *Curvature Estimates for Spacelike Hypersurfaces in de Sitter space.* Supervisors: Dr. Wilhelm KLINGENBERG. Dr. Ben LAMBERT
November 2013	Master of Science in MATHEMATICS. **Universidad Nacional Autónoma de México, UNAM**. Instituto de Matemáticas. General knowledge exams: *Differential Geometry, General Topology, (Real and Complex) Analysis.* Thesis: *Minimal immersions of Einstein-Kähler manifolds. (in Spanish).* Supervisor: Dr. Gabriel RUIZ HERNÁNDEZ
February 2011	Undergraduate degree in PHYSICS AND MATHEMATICS. **Instituto Politécnico Nacional, IPN**. Escuela Superior de Física y Matemáticas, ESFM. Thesis: *On the foundations of the quaternionic analysis and its relationship with complex analysis. (in spanish).* Supervisor: Dra. María Elena LUNA ELIZARRARÁS.

Articles

- ***Prescribed k-symmetric curvature hypersurfaces in de Sitter space.***
  Daniel Ballesteros-Chávez, Wilhelm Klingenberg, Ben Lambert.arXiv:1907.13542 [math.DG] 2019
- ***Curvature estimates of spacelike surfaces in de Sitter space.***
  Daniel Ballesteros-Chávez. arXiv:1905.09587 [math.DG] 2019.

Scholarships

Jan 2011 - Jul 2012	*CONACYT - Becas Nacionales de Posgrado.* Scholarship offered by the Mexican government to complete a master degree programme.
Oct 2015 - present	*CONACYT - Becas al Extranjero.* Scholarship offered by the Mexican government to complete a doctoral degree programme.

Teaching experience

	Teaching assistant, Facultad de Ciencias, UNAM:
2012-1	Differential Geometry in Lorenz-Minkowski space
2012-1	Convex Sets
2012-2	Several Variable Calculus
	Teaching assistant, Durham University:
Epiphany 2016	Analysis in Many Variables, Complex Analysis.
Michaelmas 2017	Analysis I.
Epiphany 2018	Analysis I.

Talks

Jul 2019	*A C^2 estimate for the prescribed curvature problem in de Sitter space* . Differential Geometry and Analysis Seminar. Marburg University.
Jul 2019	*Poster. Curvature estimates for prescribed curvature equation of hypersurfaces in de Sitter space.* Arbeitstagung on Geometry. Max Planck Institute for Mathematics, Bonn.
Aug 2018	*Poster. Dirichlet Problem for Prescribed Curvature in Hyperbolic Space (revisited).* International Conference of Mathematical Sciences (ICMS). Maltepe Univeristy, Istanbul.
Jun 2018	*Sobre el problema no lineal de k-curvatura prescrita en hipersuperficies del espacio hiperbólico y de Sitter.* Mexican Mathematicians in the World. Casa Matemática Oaxaca.
Mar 2018	*Prescribed k-curvature of convex closed hypersurfaces in H^n and S^n : a fully nonlinear elliptic problem.* Yorkshire and Durham Geometry Days. Durham University.
Apr 2017	*Fully nonlinear PDE on the sphere from prescribed curvature problem in hyperbolic space.* British Mathematical Colloquium. Durham University.
Jul 2016	*Poster. Dirichlet Problem for Prescribed Curvature in Hyperbolic Space.* LMS-CMI Research School. Reading University.
May 2016	*On the Minkowski Problem in Hyperbolic Space.* 9th European Conference on Elliptic and Parabolic Problems. Institut Für Mathematik Universität Zürich, at Gaeta, Italy.
Feb 2016	*Poster. Prescribing Homogeneous Curvatures in Hyperbolic space.* Winter School 2016 on Geometric Evolution Equations. Regensburg University.

Nov 2015	*On the Existence of Convex Surfaces with Prescribed k-Symmetric Curvatures.* Geometry and Topology Seminar. DURHAM UNIVERSITY.
May 2012	*On the ellipticity of the Laplace operator.* Fellow Junior Seminar. IM-UNAM.

Work Experience

Beside the academic experience, I have also been employed as a professional mathematician. In the National Statistical Institute of México, INEGI, the projects I was mainly involved are the national crime survey ENVIPE, urban public security ENSU and the quality of public services ENCIG. The duties and responsibilities I had included the sampling design, field work supervision and data analysis of multi-stage probabilistic surveys in households to obtain information about common crime. This experience also granted me with the sufficient skills to cooperate in international projects coordinated by the United Nations Office on Drugs and Crime UNODC, such as the firsts national surveys to measure common crime in both Panamá and Guatemala.

Oct 2016 - Feb 2017	Individual consultant. Analyst of Crime Surveys. United Nations Office on Drugs and Crime, UNODC.
Apr 2015 - Aug 2015	Deputy Director of MODELLING. National Statistical Institute, INEGI.
Mar 2013 - Mar 2015	Head of Department of MODELLING. National Statistical Institute, INEGI.
May 2012 - Feb 2013	Head of the Department of SURVEYS. National Statistical Institute, INEGI.

Other Info

- **Seminar organiser**: Graduate students seminar in Durham University form Oct. 2017.
- **Languages**: Spanish (native); English (fluent); Polish (beginner).
- **Software and Programming**: Linux Debian (advanced); R (advanced); libreOffice and MS Office (advanced); sql (intermediate); webmaster in github (intermediate); lisp (intermediate).

References

Dr. Wilhelm Klingenberg.
Address: Department of Mathematical Science. Durham University.
Phone: +44 (0) 191 334 3069
email: wilhelm.klingenberg@durham.ac.uk

Dr. Ben Lambert.
Address: Department of Mathematics. University College London.
email: b.lambert@ucl.ac.uk

Dr. Gabriel Ruiz-Hernández.
Address: IMATE-UNAM, Ciudad Universitaria, Ciudad de México.
Phone: +52 (55) 5622 4748, ext: 24748.
email: gruiz@matem.unam.mx

Dr. Fernando Galaz-Garcia .
Address: Fakultät für Mathematik. Karlsruher Institut für Technologie.
Phone: +49 721 608 41881 .
email: galazgarcia@kit.edu