Andrew CLARKE
Curriculum Vitæ

Date of birth: 10/01/1980

Laboratoire de Mathématiques Jean Leray
Université de Nantes
2, rue de la Houssinière - BP 92208
44322 Nantes Cedex 3
France
andrew.clarke@univ-nantes.fr
http://www.math.sciences.univ-nantes.fr/~clarke/
http://buscatextual.cnpq.br/buscatextual/visualizacv.jsp?id=K4326282A5

Employment

- ANR (GETOGA) Postdoctoral fellow, Laboratoire de Mathématiques Jean Leray, Université de Nantes. Since September 2009.
- EGIDE Postdoctoral fellow, École Polytechnique. October 2008 to September 2009.
- Graduate teaching assistant, SUNY at Stony Brook, United States, August 2002 to August 2008.
- Teaching assistant, University of Adelaide, Australia. 2000-2002.

Education

- Ph.D. in Mathematics, State University of New York at Stony Brook. United States, August 2008.
  Rigidity of Rank One Factors of Compact Symmetric Spaces.
  Advisor: Prof. H. Blaine Lawson Jr.,
- Bachelor of Science (Hons.), University of Adelaide, Australia. Degree with First Class Honours in Pure Mathematics. 2001.
  The Geometry and Topology of Four-Manifolds.
  Advisor: Dr Nicholas Buchdahl,
- South Australian Certificate of Education. Nuriootpa High School, Australia. 1997.

Research Interests

Riemannian geometry. In particular, problems of rigidity for minimal submanifolds of symmetric spaces; calibrated geometry and the geometry of submanifolds in the context of reduced holonomy; some constructions of metrics of special holonomy; gauge theory on manifolds of reduced holonomy.

Distinctions and Prizes

- Travel grant: SUNY Stony Brook, 2007.
- Carnegie Prize: Carnegie Foundation, 2005-6.
- President's Award: SUNY Stony Brook, 2003-2008.
- Tuition grant: SUNY Stony Brook, 2002-2008.
- Wilton Prize: University of Adelaide, 2000.
- Dean's Certificate: University of Adelaide. 1999 - 2001.

Teaching Experience

- Recitations: Calculus and elementary analysis.
- Instructer: Calculus and elementary analysis.
- Course Co-ordinator: Calculus, elementary analysis, applied algebra, elementary logic.

Personal Information

Nationality: Australian.
Languages: English, French.
Personal Status: Single.

Nantes, March 2011.

Publications

Articles accepted and submitted for publication

1. **Rigidity of rank-one factors of compact symmetric spaces**, *accepted by Annales de l'Institut Fourier*
   We consider the decomposition of a Riemannian symmetric space of compact type as a product of factors and show that, with the exception of the Cayley plane, the factors of rank one are rigid when considered as minimal submanifolds. The other spaces of rank-one admit Hopf fibrations with total space a sphere, allowing us to deduce the result in this case.

2. **The Perron method and the non-linear plateau problem**, *with Graham Smith (CRM, Bellaterra), submitted for publication*
   We give a technique inspired by the recent work of Harvey and Lawson to resolve the plateau problem for hypersurfaces of constant curvature. This is illustrated by an example of of constant Gaussian curvature in $\mathbb{R}^{n+1}$.

3. **Minimal surfaces in G2 manifolds**, *submitted for publication*
   We define the twistor space $\mathcal{Z}_X$ of a manifold X of G_2 holonomy and show that it admits a distribution of codimension one that supports a hermitian structure. For every Riemann surface Σ immersed in X there exists a lifting $\tilde{\Sigma}$ to $\mathcal{Z}_X$ that is tangent to the distribution. If Σ is an *adapted* surface in X, it is a *minimal* surface if and only if the lifting is a pseudo-holomorphic curve.

These articles are available at `http://www.math.sciences.univ-nantes.fr/~clarke/`

Work in progress

1. G_2 **Instantons on the manifolds of Bryant and Salamon**, *in preparation*

2. **Instantons on the Kummer surface**, *in preparation*

Research Activities

Conference Presentations

- Workshop de ANR (GéomEinstein), Université de Montpellier II, March 2010.
- Journées Nancéiennes de Géométrie 2009, Institut Élie Cartan, Université de Nancy, January 2009.

Seminar Presentations

- IMPA, Rio de Janeiro, Brazil, August 2010.
- Centre de Recerca Matemàtica, Bellaterra, Spain, November 2009.
- Université de Nantes, France, September 2009.
- Université de Provence, Aix-Marseille I, France, May 2009.
- Institut Joseph Fourier, Université de Grenoble 1, France, April 2009.
- Institut de Mathématiques Jussieu, France, December 2008.
- École Polytechnique, France, October 2008.
- University of Adelaide, Australia, June 2008

Participation in Conferences

- Complex and Riemannian Geometry, CIRM Marseille, France, February 2011
- XVI Escola de Geometria Diferencial, Universidade de São Paulo, Brazil, July 2010.
- Workshop on Kähler and Related Geometry, Nantes, France, November 2009.
- Arbeitsgemeinschaft: Minimal Surfaces, Oberwolfach, Germany, October 2009.
- Geometry of Einstein Manifolds, Nantes, France, June 2009.
- XV Escola de Geometria Diferencial, UFC Fortaleza, Brazil, July 2008.
- Special Structures in Riemannian Geometry, BIRS Banff, Canada, February 2008.
- Differential Geometry, Mathematical Physics: Mathematics and Society, IHES, Bures-sur-Yvette, France, August 2007.

- Calibrations Workshop, AIM Palo Alto, United States, July 2006.
- Special Geometries in Mathematical Physics, Kühlungsborn, Germany, March 2006.

Departmental research activities

- Co-organiser with G. Carron of the Nantes working groups on G_2 geometry (2010) and gauge theory (2010-2011).
- Co-organiser with D. Gromoll of the Stony Brook working group on metrics of positive curvature (2006).

Short Visits

- (to visit Graham Smith) CRM, Bellaterra, Spain. One week, November 2009.
- (to visit Fernando Codá Marques) IMPA, Rio de Janeiro, Brazil. Two months, June-August 2010.

Teaching Activities

- **2008 - 2011 Postdoctoral fellow without teaching** at Ecole Polytechnique and the Université de Nantes. I contributed to the working groups on gauge theory and G_2 geometry within the research group Geometry and Global Analysis. In this capacity I gave many presentations to colleagues and doctoral students. I communicated frequently to the students about their own research and gave them another geometric point of view for their problems.

- **2002 -2008 Graduate Teaching Assistant** at SUNY Stony Brook. I taught for the entire duration of my thesis, with varied responsibilities including giving recitatations, delivering lectures, and being the person responsible for the courses. Topics taught: Calculus, elementary analysis, applied algebra, introductory logic.

- **2001 - 2002 Teaching Assistant** at the University of Adelaide. Topics taught: Calculus, statistics.

Doctoral Thesis

Rigidity of Rank-One Factors of Compact Symmetric Spaces

Thesis of Doctorate of Philosophy in Mathematics at the State University of New York at Stony Brook. Defended at Stony Brook the 15th of August 2008 before the commitee:

Advisor	H. Blaine Lawson Jr.	SUNY Stony Brook
Chairman of defence committee	Claude LeBrun	SUNY Stony Brook
Examiners	Michael Anderson	SUNY Stony Brook
	Martin Roček	SUNY Stony Brook Department de Physics.

Abstract

In this investigation we discuss the submanifolds of product spaces and we prove theorems of rigidity for such submanifolds. Specifically, we consider closed minimal submanifolds $M \subseteq M_1 \times M_2$ where M_1 and M_2 are compact symmetric spaces. If both factors are of rank one and M is minimal and satisfies two bounds on its data, then it must be a totally geodesic subspace of the first factor. If only the first factor is of rank one it is necessary to suppose that the submanifold is of the same dimension as that factor to obtain similar results.

In particular, this implies that the factors of rank one are isolated from those minimal submanifolds that are not of that type.

This analysis does not apply to the exceptional case of the Cayley plane, because that space does not admit a Hopf-fibration with total space a euclidean sphere.

State University of New York

State University at Stony Brook

On the recommendation of the Faculty and by virtue of the authority vested in them the Trustees of the University have conferred on

Andrew James Clarke

the Degree of

Doctor of Philosophy

Mathematics

and have granted this Diploma as evidence thereof

Given at Stony Brook, in the State of New York, in the United States of America on the twenty-first day of August two thousand eight.

Chairman of the Board of Trustees

Chairman of the Council,
State University at Stony Brook

STATE UNIVERSITY OF NEW YORK — TO LEARN — TO SEARCH — TO SERVE — 1948

Interim Chancellor of the State University of New York

President,
State University at Stony Brook