Caleb Andrew Meier

UC San Diego
Department of Mathematics
9500 Gilmann Drive #0112
La Jolla, CA 92093-0112

Phone: (434) 989-4192
Email: c1meier@math.ucsd.edu
Homepage: http://math.ucsd.edu/∼c1meier

Education

UC San Diego - Ph.D. Mathematics, 2012.

Yale University - B.A. Mathematics, 2006.

Research Experience

UC San Diego - Post Doctoral Research (2012-Present)

My research revolves around using techniques from bifurcation theory and nonlinear functional analysis to extend the solution theory of the Einstein constraint equations and further understand non-uniqueness phenomena associated with these equations.

UC San Diego - PhD Study (2008-2012)

I worked with Professor Michael Holst to investigate unresolved issues with the existence and uniqueness theory of the conformal formulation of the Einstein constraint equations of general relativity. The research involves the areas of partial differential equations, differential geometry, functional analysis, and gravitational physics.

UC San Diego - Noncommutative Algebra(2008-2012)

I worked with Professor Bill Helton to develop algorithms to represent particular families of polynomials as a single noncommutative polynomial in two variables.

Yale University - Ornithology, Image Processing and Programming (2007)

I worked with Professor Rick Prum to apply image processing techniques to transmission electron micrographs of samples of feather barbs to explore the connection between the nanostructure of the feather and the formation of non-irridescent colors in birds.

Teaching Experience

UC San Diego - Visiting Lecturer (2012 - Present)

Duties include overseeing and coordinating the class, maintaining a course webpage, managing teaching assistants, writing exams and preparing and presenting lectures.

Courses: Math 20D (Differential Equations), Math 20E (Vector Calculus) and Math 20C (Calculus).

UC San Diego - Associate Instructor (2011)

Duties included overseeing and coordinating the class, maintaining a course webpage, managing teaching assistants, writing exams and quizzes, and preparing and presenting lectures.

Courses: Math 10A(Calculus)

UC San Diego - Teaching Assistant (2007-2012)

Duties include conducting discussion sections, holding office hours, grading homework assignments and exams, and maintaining course data.

Courses: Math 10B (Calculus), Math 20B (Calculus), Math 20C (Calculus), Math 20D (Differential Equations), Math 20E (Vector Calculus), Math 110 (Partial Differential Equations), Math 130 A/B

(Upper Division Differential Equations), Math 140 A/B (Advanced Analysis), Math 142 (Analysis) Math 180A (Probability).

Publications

M. Holst, C. Meier. Generalized Solutions of Semilinear Elliptic PDE with Applications to the Lichnerowicz Equation. *Acta Appicandae Mathematicae*, 10.1007/s10440-013-9842-3, 2013.

H. Dym, J. W. Helton, C. Meier. Noncommutative Representations of Families of k^2 Commutative Polynomials in $2k^2$ Commuting Variables. *International Journal of Algebra and Computation*, **23(7)**, 2013.

Pending Publications

M. Holst, C. Meier. Non-uniqueness of Solutions to the Conformal Formulation. Available as arXiv:1210.2156v1.

M. Holst, C. Meier. An Alternative Between Non-unique and Negative Yamabe Solutions to the Conformal Formulation of the Einstein Constraint Equations. Available as arXiv:1306.1210v1 .

M. Holst, C. Meier. Non-CMC Solutions to the Einstein Constraint Equations on Compact Manifolds with Apparent Horizon Boundaries. Available as arXiv:1310.2302v1 [gr-qc].

J. Dilts, J. Isenberg, R. Mazzeo, C. Meier. Non-CMC Solutions to the Einstein Constraint Equations on Asymptotically Euclidean Manifolds. Available as arXiv:1312.0535v1 [gr-qc].

Conferences and Workshops

Geometric Analysis and Relativity. Hefei, China. July 2014.

MSRI Mathematical General Relativity Program. Berkeley, CA. October 2013.

Joint MAA-AMS Mathematics Meetings. San Diego, CA. January 2013.

MSRI Summer Graduate Workshop in Mathematical Relativity. Berkeley, CA. July 2012.

Talks

Bifurcating Solutions to the Einstein Constraints and Negative Yamabe Far-from-CMC Solutions. Initial Data and Evolution Problems in General Relativity. Berkeley, CA. November 2013.

Non-CMC Solutions to the Einstein Constraint Equations on Compact Manifolds with Apparent Horizon Boundaries. MSRI PDE Seminar. Berkeley, CA. October 2013.

Non-uniqueness of Solutions to the Conformal Formulation of the Einstein Constraint Equations. Joint MAA-AMS Mathematics Meetings. San Diego, CA. January 2013.

Unresolved Issues with the Conformal Formulation. Computational Science and Mathematics Seminar. La Jolla, CA. September 2012.

Bifurcation Theory and Non-uniqueness in Nonlinear Problems. Center of Computational Mathematics Seminar. La Jolla, CA. June 2012.

Computer Skills

Java, C++, Mathematica, MATLAB

Teaching Evaluations

For a full list of past teaching evaluations, go to http://math.ucsd.edu/∼c1meier.