

# Johnny Guzmán

Assistant Professor  
Division of Applied Mathematics  
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## Employment

*Brown University, Division of Applied Mathematics*  
2008-            Assistant Professor

*University of Minnesota, School of Mathematics*  
2005-2008      NSF Postdoctoral Fellow

## Education

*Cornell University*  
2005            Ph.D. Applied Mathematics

*California State University-Long Beach (CSULB)*  
1999            B.S. Mathematics

## Journal Articles

### *Appeared/ In Press*

1. J. Guzmán, *Quadrature and Schatz's pointwise estimates in finite element methods*, BIT 45 (2005), 695-707.
2. J. Guzmán, *Local analysis of discontinuous Galerkin methods applied to singularly perturbed problems*, J. Numer. Math. 14 (2006), 41-56.
3. J. Guzmán, *Pointwise estimates for discontinuous Galerkin methods with lifting operators for elliptic problems*, Math. Comp. **75** (2006), 1067-1085.
4. J. Guzmán, *Local and pointwise error estimates of the local discontinuous Galerkin method for Stokes Problem*, Math. Comp. **77** (2008), 1293-1322.
5. B. Cockburn, B. Dong and J. Guzmán, *Optimal convergence of the original discontinuous Galerkin method for the transport-reaction equation on special meshes*, SIAM J. Numer. Anal. 46 (2008), 1250-1265.

6. B. Cockburn and J. Guzmán, *Error estimates for the Runge-Kutta discontinuous Galerkin method for the transport equation with discontinuous initial data*, SIAM J. Numer. Anal. 46 (2008), 1364-1398.
7. B. Cockburn, B. Dong and J. Guzmán, *A superconvergent LDG-hybridizable Galerkin method for second-order elliptic problems*, Math. Comp. 77 (2008), 1887-1916.
8. B. Cockburn, J. Guzmán and H. Wang, *Superconvergent discontinuous Galerkin methods for second-order elliptic problems*, Math. Comp., 78 (2009), 1-24.
9. E. Burman, J. Guzmán and D. Leykekhman, *Weighted error estimates of the continuous interior penalty method for singularly perturbed problems*, IMA J. Numer. Anal., 29 (2009), 284-314.
10. J. Guzmán, and B. Riviere, *Suboptimal convergence of nonsymmetric discontinuous Galerkin method for odd polynomial approximations*, J. Sci. Comp., 40 (2009), 273-280.
11. J. Guzmán, D. Leykekhman, J. Rossmann and A. Schatz, *Hölder estimates for Greens functions on convex polyhedral domains and their applications to finite element methods*, Numer. Math., 112 (2009), 221-243.
12. B. Cockburn, B. Dong and J. Guzmán, *A hybridizable and superconvergent discontinuous Galerkin method for biharmonic problems*, J. Sci. Comput., 40 (2009), 141-187.
13. B. Cockburn, J. Guzmán, C.-S. Soon and H. Stolarski, *Analysis of the embedded discontinuous Galerkin method for second-order elliptic problems*, SIAM J. Num. Anal., 47 (2009), no. 4, 2686-2707.
14. B. Cockburn, B. Dong, J. Guzmán, M. Restelli and R. Sacco, *A hybridizable discontinuous Galerkin method for steady state convection-diffusion-reaction problems*, SIAM J. Sci. Comp., 31 (2009), no. 5, 3827-3846.
15. B. Cockburn, J. Gopalakrishnan and J. Guzmán, *A new elasticity element made for enforcing weak stress symmetry*, Math. Comp., 79 (2010), 1331-1349.
16. B. Cockburn, B. Dong, J. Guzmán and J. Qian, *Optimal convergence of the original DG method in special meshes for variable velocity*, Siam J. Num. Anal., 48 (2010), no. 1, 133-146.
17. J. Guzmán, *A unified analysis of several mixed methods for elasticity with weak symmetry*, J. Sci. Comp., 44 (2010), no. 2, 156-169.
18. A. Demlow, J. Guzmán, and A.H. Schatz, *Local energy estimates for the finite element method on sharply varying grids*, Math. Comp. 80 (2011), 1-9.
19. W. Wang, J. Guzmán and C.-W. Shu, *The multiscale discontinuous Galerkin method for solving a class of second-order elliptic problems with rough coefficients*, Int. J. Numer. Anal. Model, 8(2011), no. 1, 28-47.
20. J. Gopalakrishnan and J. Guzmán, *A second elasticity element using the matrix bubble*, IMA J. Numer. Anal, to appear.
21. E.M. Behrens and J. Guzmán, *A mixed method for the biharmonic problem based on a system of first order equations*, SIAM J. Numer. Anal, 49 (2011), 789-817.
22. E.M. Behrens and J. Guzmán, *A new family of mixed methods for the Reissner-Mindlin plate model based on a system of first-order equations*, J. Sci. Comp., to appear.
23. J. Gopalakrishnan and J. Guzmán, *Symmetric non-conforming mixed finite elements for linear elasticity*, SIAM J. Numer. Anal, to appear.

*Under Review*

24. J. Guzmán and D. Leykekhman, *Pointwise error estimates of finite element approximations to the Stokes problem on convex polyhedra*, submitted.
25. B. Cockburn, J. Guzmán, F.J. Sayas, *Coupling of RT and HDG with BEM*, submitted.
26. J. Guzmán and M. Neilan, *A family of non-conforming elements for the Brinkman problem*, submitted.

27. J. Guzmán, D. Leykekhman and M. Neilan, *A family of non-conforming elements and analysis of Nitsche's method for a singularly perturbed fourth-order problem*, submitted.

## Selected Presentations

- Analysis and PDE Seminar, U. Delaware, March 2011.
- Mini-symposium presentation, SIAM annual meeting, Pittsburgh, July 2010
- Plenary talk, SIDIM, Univeristy of Puerto Rico-Mayagüez, Feb. 2009
- Mathematics Colloquium, WPI, Worcester, MA, Nov. 2009
- Applied Math Seminar, IMPA, Rio de Janeiro, Brazil, April 2009
- Three talks at MAFELAP, Brunel U., United Kingdom, June 2009
- Finite Element Circus, U. Delaware, DE, May 2009
- Applied Math Seminar, Michigan State U., East Lansing, MI, Mar. 2009
- Finite Element Circus, RPI, Troy, NY, Oct. 2008
- Computational and Applied Mathematics Seminar, UCI, Irvine, CA, April 2008
- Special Colloquium, Brown U., Providence, RI, Jan. 2008
- Special Colloquium, LSU, Baton Rouge, LA, Jan. 2008
- Numerical Analysis Seminar, Texas A&M, College Station, TX, Dec. 2007
- Special Colloquium, University of Illinois-Chicago, Chicago, IL, Dec. 2007
- BIRS meeting on DG methods, Banff, Alberta Canada, Nov. 2007
- Special Numerical Analysis/PDE seminar, U. of Kentucky, Lexington, KY, Sep. 2007
- Finite Element Circus, University of Maryland, College Park, MD, April 2007
- Computational and Applied Math Colloquium, Rice U., Houston, TX, April 2007
- Finite Element Circus, Penn State U., State College, PA, Nov. 2006
- DG mini-symposium, 7th World congress on computational mechanics, Los Angeles, CA, July 2007
- DG mini-symposium, AMS annual conference, Atlanta, GA, Jan. 2005
- Workshop on Numerical Approximations to PDE, Concepcion, Chile, Jan. 2004

## Grants

### *Completed Grants*

- NSF, Division of Mathematical Sciences, Postdoctoral Research Fellowship, 2005-2008, PI, \$108,000

### *Current Grants*

- NSF, Division of Mathematical Sciences, # 0914596, 2009-2012, PI, \$189,826
- NSF, Division of Mathematical Sciences (SCREMS), # 0922803, 2009-2011, CO-PI, \$86,420

## Service

### *University Service*

- Member of 2008 search committee for Prager Assistant Professor

- Applied mathematics library representative for 2009
- Mentor for Brown University's African, Latino, Asian and Native American (ALANA) mentoring program, 2008-2009 and 2009-2010
- Served on a Ph.d. thesis committee
- Undergraduate advisor during 2011.

### *Professional Service*

- Referee work for Mathematics of Computation, SIAM Journal on Numerical Analysis, Numerische Mathematik, Journal of Scientific Computing, Computer Methods in Applied Mechanics and Engineering, M2AN, Science in China: Series A-Mathematics, Journal of Computational Physics, Journal of Computational and Applied Mathematics
- Local organizer for Finite Element Circus Conference in the Spring 2010, Brown University
- Guest organizer of Finite Element Circus Fall 2010, IMA.
- Co-organized the DG mini-symposium in the 2009 MAFELAP conference, Brunel U., UK
- NSF panel member
- Poster Judge at the 2006, 2007 and 2009 national conferences of the Society for the Advancement of Chicanos and Native-Americans in Science

### **Awards and Honors**

2005	NSF Postdoctoral Fellowship
1999	Ford Foundation and Cornell-Sloan Fellowships
1999	CSULB's Outstanding Graduate in Mathematics

### **Teaching**

#### *Brown University*

- Fall 2008, Applied Math 34, Introduction of Differential Equations
- Spring 2009 and Spring 2011, Applied Math 118, Introduction to Numerical Solution to Differential Equations
- Fall 2009, Applied Math 257, Numerical Solution to Partial Differential Equations III
- Spring 2010, Applied Math 16, Introduction to Scientific Computing

#### *University of Minnesota*

- Calculus
- Sequences, Series and Foundations

#### *Cornell University*

- Calculus
- Real Analysis (in the Summer Math Institute)