

## Stefano Giani

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### PROFESSIONAL QUALIFICATIONS

#### **Postdoctoral position, School of Mathematical Sciences, University of Nottingham, 2010—2012**

Details: Research Fellow in the Research and Teaching Family.

My position is funded by EPSRC with the topic: Multilevel Preconditioners based on Composite  
**Finite Element Methods for Fluid Flow Problems.**

#### **Visitor position, inuTech, Nuremberg, 2009**

Details: I took part in the European project MIDEA, on high and mid frequency acoustic problems.

#### **Postdoctoral position, School of Mathematical Sciences, University of Nottingham, 2007—2009**

Details: Research Fellow in the Research and Teaching Family.

My main duty is to research on adaptive higher order finite element methods for aerospace applications for the European project called ADIGMA.

### AWARDS

In 2009 I won the **14th Leslie Fox Prize**.

### PUBLICATIONS

#### **BOOK CHAPTERS**

P. F. Antonietti, A. Cangiani, J. Collis, Z. Dong, E. H. Georgoulis, S. Giani, and P. Houston, Review of Discontinuous Galerkin Finite Element Methods for Partial Differential Equations on Complicated Domains. - In Barth, T.J., Griebel, M., Keyes, D.E., Nieminen, R.M., Roose, D., Schlick, T., editors, Lecture Notes in Computational Science and Engineering. Lecture Notes in Computational Science and Engineering, Springer, 2016

S. Giani and P. Houston, *High-Order hp-Adaptive Discontinuous Galerkin Finite Element Methods for Compressible Fluid Flows*, In N. Kroll, H. Bieler, H. Deconinck, V. Couallier, H. van der Ven and K. Sorensen, editors, ADIGMA - A European Initiative on the Development of Adaptive Higher-Order Variational Methods for Aerospace Applications, Springer, 2010

#### **PAPERS**

S. Giani, L. Grubisic, C. Engstrom (2016), *Efficient and reliable hp-FEM estimates for quadratic eigenvalue problems and photonic crystal applications*. - Computers and Mathematics with

Applications, Accepted.

S. Giani, L. Grubisic and J. Owall (2016), *Benchmark results for testing adaptive finite element eigenvalue procedures part 2*. - Applied Numerical Mathematics 102, 1-16.

S. Giani and M. Seaid (2016), *hp-adaptive discontinuous Galerkin methods for simplified PN approximations of frequency-dependent radiative transfer*. - Computer Methods in Applied Mechanics and Engineering 301, 52-79.

S. Giani, L. Grubisic, A. Meidlar and J. Owall (2015), *Robust estimates for hp-adaptive approximations of non-self-adjoint eigenvalue problems*. - Numerische Mathematik 133(3), 471-495.

S. Giani (2015), *hp-Adaptive Composite Discontinuous Galerkin Methods for Elliptic Eigenvalue Problems on Complicated Domains*. - Applied Mathematics and computation, Accepted.

S. Giani (2015), Solving elliptic eigenvalue problems on polygonal meshes using discontinuous Galerkin composite finite element methods. - Applied Mathematics and computation, Accepted.

S. Giani, P. Houston (2014), *hp-Adaptive Composite Discontinuous Galerkin Methods for Elliptic Problems on Complicated Domains*. - Numerical Methods for Partial Differential Equations 30(4), 1342-1367.

S. Giani (2014), *A hp-adaptive discontinuous Galerkin method for plasmonic waveguides*. - Journal of Computational and Applied Mathematics 270, 12-20.

S. Giani, P. Houston (2014), *Goal-Oriented Adaptive Composite Discontinuous Galerkin Methods for Incompressible Flows*. - Journal of Computational and Applied Mathematics 270, 32-42.

P. Antonietti, S. Giani and P. Houston (2014), *Domain Decomposition Preconditioners for Discontinuous Galerkin Methods for Elliptic Problems on Complicated Domains*. - Journal of Scientific Computing 60(1), 203-227.

S. Giani, D. Schötzau and L. Zhu (2014), *An a-posteriori error estimate for hp-adaptive DG methods for convection-diffusion problems on anisotropically refined meshes*. - Computers and Mathematics with Applications 67, 869-887.

S. Giani, P. Houston (2013), *Domain Decomposition Preconditioners for Discontinuous Galerkin Discretizations of Compressible Fluid Flows*. - Numerical Mathematics: Theory, Methods and Applications 7(2), 123-148.

S. Giani, L. Grubisic and J. Owall (2013), *Error control for hp-adaptive approximations of semi-definite eigenvalue problems*. - Computing 95(1), 235-257.

P. Antonietti, S. Giani and P. Houston (2013), *hp-version composite discontinuous Galerkin methods for elliptic problems on complicated domains*. - SISC 35(3), A1417-A1439.

S. Giani (2013), *An a posteriori error estimator for hp-adaptive continuous Galerkin methods for photonic crystal applications*. - Computing 95(5), 395-414.

S. Giani (2013), *High-order/hp-adaptive discontinuous Galerkin finite element methods for acoustic problems*. - Computing 95(1), 215-234.

- P. Solin and S. Giani (2013), *An iterative adaptive hp-FEM method for non-symmetric elliptic eigenvalue problems*. - Computing 95(1), 183-213.
- S. Giani and E. Hall (2013), *An a-posteriori error estimate for hp-adaptive DG methods for elliptic eigenvalue problems on anisotropically refined meshes*. - Computing 95(1), 319-341.
- D.J. Chappell, G. Tanner and S. Giani (2012), *Boundary element dynamical energy analysis: a versatile method for solving two or three dimensional wave problems in the high frequency limit*. - Journal of Computational Physics 231(18), 6181-6191.
- S. Giani and P. Houston (2012), *Anisotropic hp-adaptive discontinuous Galerkin finite element methods for compressible fluid flows*. - International Journal of Numerical Analysis and Modeling 9(4), 928-949.
- S. Giani and I.G. Graham (2012), *Adaptive finite element methods for computing band gaps in photonic crystals*. - Numerische Mathematik 121(1), 31-64.
- S. Giani, L. Grubisic and J. Owall (2012), *Benchmark results for testing adaptive finite element eigenvalue procedures*. - Applied Numerical Mathematics 62(2), 121-140.
- S. Giani (2012), *Convergent adaptive finite element methods for photonic crystal applications*, Mathematical Models and Methods in Applied Sciences (M3AS), Accepted.
- S. Giani (2012), *An a posteriori error estimator for hp-adaptive discontinuous Galerkin methods for computing band gaps in photonic crystals*, Journal of Computational and Applied Mathematics, Accepted.
- S. Giani and E. Hall (2012), *An A Posteriori Error Estimator for Hp-Adaptive Discontinuous Galerkin Methods for Elliptic Eigenvalue Problems*, Mathematical Models and Methods in Applied Sciences (M3AS), Accepted.
- S.Giani, L. Grubisic, J. S. Owall (2011), *Benchmark results for testing adaptive finite element eigenvalue procedures*, Applied Numerical Mathematics 62(2), 121-140.
- S. Giani and P. Houston (2011), *Anisotropic hp-adaptive discontinuous Galerkin finite element methods for compressible fluid flows*, International Journal of Numerical Analysis and Modeling, Accepted.
- S. Giani and I.G. Graham (2011), *Adaptive finite element methods for computing band gaps in photonic crystals*, Numerische Mathematik, Accepted.
- D. Chappell, S. Giani and G. Tanner (2011), *Dynamical energy analysis for built-up acoustic systems at high frequencies*, J. Acoust. Soc. Am. (JASA) 130(3), 1420-1429.
- L. Zhu, S. Giani, P. Houston and D. Schötzau (2011), *Energy Norm A-Posteriori Error Estimation for hp-Adaptive Discontinuous Galerkin Methods for Elliptic Problems in Three Dimensions*, Mathematical Models and Methods in Applied Sciences (M3AS) 21(2), 267-306.

S. G. and I. G. Graham (2009), *A convergent adaptive method for elliptic eigenvalue problems*, SIAM J. Numer. Anal. 47(2) , 1067-1091

## **PEER REVIEWED CONFERENCE PAPERS**

G. Tanner, D. Chappell, H. B. Hamdin, S. Giani, C. Seidel and F. Vogel, *Acoustic energy distribution in multi-component structures - Dynamical Energy Analysis versus numerically exact results*. - ISMA2010 International Conference on Noise and Vibration Engineering, 20-22 September 2010, Leuven/Belgium

G. Tanner and S. Giani, *Wave transport in complex vibro-acoustic structures in the high-frequency limit*. - IUTAM Symposium on Vibration Analysis of Structures with Uncertainties , Proceedings of the IUTAM Symposium on the Vibration Analysis of Structures with Uncertainties held in St. Petersburg, Russia, July 5-9, 2009, Springer

S. Giani and I.G. Graham, *Convergence of adaptive finite element methods for elliptic eigenvalue problems with applications to photonic crystals*. - Mathematisches Forschungsinstitut Oberwolfach , Report No. 37/2009 (2009)

## **EDUCATION**

### **Ph.D., Mathematical Sciences, University of Bath , 2004—2008**

Concentrations: Numerical Analysis, Eigenvalue Problems, Applications to Photonic Crystals

Dissertation: Convergence of Adaptive Finite Element Methods for Elliptic Eigenvalue Problems with Applications to Photonic Crystals

Supervisor: Prof. Ivan G. Graham

### **M.Sc. In Applied and Computational Mathematics, Oxford University, 2003—2004**

Concentrations: Numerical Analysis, Symplectic Methods

Dissertation: Magnus Series Methods for Des

Supervisor of Dissertation: Prof. Endre Süli

### **Degree, Mathematical Sciences, Università di Pavia, 1998—2003**

Dissertation: Calcolo degli Autovalori della Cavità Risonante

Mark: 110/110 cum laude (full mark with laude)

Supervisor of Dissertation: Prof. Daniele Boffi

As a student, I was affiliated with the Borromeo's University College, an institution of excellent which is comparable to The Scuola Superiore Sant'Anna of Pisa.

## **Recent Talks:**

- A discontinuous Galerkin method for solving elliptic eigenvalue problems on polygonal meshes with hp-adaptivity - 2018, ECCOMAS ECCM-ECFD 2018 2018 , Glasgow
- A discontinuous Galerkin method for solving elliptic eigenvalue problems on polygonal meshes with hp-adaptivity - 2018, ESCO 2018 , Pilsen
- High-Order/hp-Adaptive Multilevel Discontinuous Galerkin Methods with applications in fluid dynamics - 2016, ESCO 2016 , Pilsen
- High-Order/hp-Adaptive Multilevel Discontinuous Galerkin Methods - 2014, ESCO 2014 , Pilsen
- An Iterative Finite Element Method with Adaptivity for Multiple Eigenvalues - 2012, ESCO

- 2012 , Pilsen
- High-Order/hp-Adaptive Discontinuous Galerkin Finite Element Methods for Compressible Fluid Flows - 2012, ESCO 2012 , Pilsen
- High-Order/hp-Adaptive Multilevel Methods for Acoustics – 2012, InnoWave 2012, Nottingham
- High-Order/hp-Adaptive Discontinuous Galerkin Finite Element Methods for Compressible Fluid Flows - 2011, FEF 2011 , Munich
- Convergence of adaptive finite element methods for elliptic eigenvalue problems with applications to photonic crystals - 2009, MFO , Oberwolfach
- A convergent adaptive method for elliptic eigenvalue problems - 2009, 14th Leslie Fox Prize, Warwick
- A convergent adaptive finite element method for photonic crystal fiber applications - 2009, MAFELAP 09 , Brunel
- High-Order/hp-Adaptive Discontinuous Galerkin Finite Element Methods for Compressible Fluid Flows - 2009, BAMC 09, Nottingham
- Convergence of adaptive FEM for elliptic eigenvalue problems - 2008, ZSS 08, Zürich
- High-Order/hp-Adaptive Discontinuous Galerkin Finite Element Methods for Compressible Fluid Flows - 2008, IACM/ECCOMAS Congress 2008, Venice

### **Studentships:**

EPSRC Studentship (MSC), University of Oxford, 2003-2004

EPSRC Studentship (PhD), University of Bath, 2004-2007

### **Skills:**

Strong problem-solving, conceptualization and research skills

Programming ability in C, C++, Fortran 95, Java and Pascal

Parallel Programming ability in MPI

FemLab and MatLab

Many other Numerical Packages

Italian natural speaker

Fluent in English

### **TEACHING**

- ◆ Lecturer, Analytical & numerical methods for ODEs & PDEs, Durham, 2015 - present
- ◆ Lecturer, Static systems, Durham, 2015 - present
- ◆ Lecturer, Linear solvers with MPI, Durham, 2014 - present
- ◆ Lecturer, Finite element analysis in MatLab, Durham, 2013 - 2016
- ◆ Lecturer, Analytical methods, Durham, 2014 – 2015
- ◆ Lecturer, Numerical methods, Durham, 2013 – 2015
- ◆ Laboratory Assistant, Introduction to Fortran, Pavia, 2002
- ◆ Tutor, Numerical analysis, Bath, 2004 and 2006
- ◆ Tutor, Analysis: Real numbers, real sequences & series, Bath, 2006
- ◆ Tutor, Introduction to statistics & probability 1, Bath, 2005