Georgios Akrivis

Curriculum vitæ

Personal data

Year of birth 1950

Place of birth Chrysovitsa by Ioannina, Greece

Education

1968–1973 **Bachelor**, *University of Ioannina*, Ioannina.
Mathematics

1977–1983 **PhD**, *University of Munich*, Munich, Germany.
Mathematics, Numerical Analysis

Professional Appointments

1995–present **Professor**, *Department of Computer Science & Engineering, University of Ioannina*, Ioannina.

1991–1995 **Associate Professor**, *Mathematics Department, University of Crete*, Heraklion, Crete.

1987–1991 **Assistant Professor**, *Mathematics Department, University of Crete*, Heraklion, Crete.

1984–1987 **Visiting Assistant Professor**, *Mathematics Department, University of Crete*, Heraklion, Crete.

Fall 2012 **Visiting Researcher**, *Basque Center for Applied Mathematics*, Bilbao, Basque Country, Spain.

Fall 2001, 2003, 2005, 2007, 2009 **Visiting Professor**, *Mathematics and Statistics Department, University of Cyprus*, Nicosia, Cyprus.

June 2009 **Invited Professor**, *Institut d'Analyse et Calcul Scientifique, Section de Mathématiques, École Polytechnique Fédérale de Lausanne*, Lausanne, Switzerland.

October 1994, June 1999 **Invited Professor**, *Mathematics Department, Université de Rennes I*, Rennes, France.

Fall 1991 **Visiting Associate Professor**, *Mathematics Department, University of Tennessee*, Knoxville, TN, USA.

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Spring 1989 **Visiting Assistant Professor**, *Mathematics Department, University of Tennessee*, Knoxville, TN, USA.

1980–1984 **Teaching Fellow and Research Assistant**, *Mathematics Institute, University of Munich*, Munich, Germany.

Research Area

Numerical Analysis **Numerical methods for evolution P.D.E's**.

Languages

Greek, English, German

Conferences

Speaker, *in several conferences.*

Invited speaker, *in several conferences.*

Member of scientific committees, *of several conferences.*

Co-organizer **Numerical Methods for Evolution Partial Differential Equations**, *Euroconferences in Mathematics on Crete: Training and Mobility of Researchers Programme*, Anogia, Crete, June 24–30, 2000.

Member of scientific committee **Modern Mathematical Methods in Science and Technology (M3ST)**, *Kalamata, Greece, August 26–28, 2012.*

Co-organizer **6th Workshop in Crete on Numerical Methods for Evolution Equations**, *Heraklion, Crete*, September 21-22, 2012.

Co-organizer **Fifth International Conference in Numerical Analysis (NumAn 2012)**, *Recent Approaches to Numerical Analysis: Theory, Methods and Applications*, Ioannina, September 5-8, 2012.

Co-organizer **7th Workshop in Crete on Numerical Methods for Evolution Equations**, *Heraklion, Crete*, September 19-20, 2014.

Member of scientific committee **Modern Mathematical Methods in Science and Technology (M3ST)**, *Kalamata, Greece, August 30 – September 1, 2015.*

Co-organizer **8th Workshop in Crete on Numerical Methods for Evolution Equations**, *Heraklion, Crete*, September 23-24, 2016.

Graduate Students

1995 **Georgios Zouraris**, *Ph.D. Thesis*, Analysis of numerical methods for evolution partial differential equations, University of Crete.
He is currently Professor at the Department of Mathematics and Applied Mathematics of the University of Crete.

1998 **Panagiotis Chatzipantelidis**, *Ph.D. Thesis*, On finite volume and finite element methods for boundary and initial–boundary value problems, University of Crete.
He is currently Associate Professor at the Department of Mathematics and Applied Mathematics of the University of Crete.

2000 **Fotini Karakatsani**, *Master's Thesis*, Implicit–explicit multistep methods for evolution partial differential equations, University of Ioannina.
She is currently Lecturer at the University of Chester, Chester, United Kingdom.

Publications

- **Journal Publications**.

1. R. P. Agarwall, G. Akrivis: *Boundary value problems occurring in plate deflection theory.* J. of Comp. and Appl. Math. **8** (1982) 145–154.
2. G. Akrivis, K.–J. Förster: *On the definiteness of quadrature formulae of Clenshaw–Curtis type.* Computing **33** (1984) 363–366.
3. G. Akrivis: *Fehlerabschätzungen für Gauss–Quadraturformeln.* Numer. Math. **44** (1984) 261–278.
4. G. Akrivis, A. Burgstaller: *Fehlerabschätzungen für nichtsymmetrische Gauss–Quadraturformeln.* Numer. Math. **47** (1985) 535–543.
5. G. Akrivis: *The error norm of certain Gaussian quadrature formulae.* Math. Comp. **45** (1985) 513–519.
6. G. D. Akrivis, V. A. Dougalis: *Finite difference discretization with variable mesh of the Schrödinger equation in a variable domain.* Bull. Greek Mathem. Soc. **31** (1990) 19–28.
7. G. D. Akrivis, V. A. Dougalis: *On a class of conservative, highly accurate Galerkin methods for the Schrödinger equation.* (RAIRO:) Math. Model. and Numer. Anal. **25** (1991) 643–670.
8. G. D. Akrivis, V. A. Dougalis: *Finite difference discretizations of some initial and boundary value problems with interface.* Math. Comp. **56** (1991) 505–522.
9. G. D. Akrivis, V. A. Dougalis, O. A. Karakashian: *On fully discrete Galerkin methods of second–order temporal accuracy for the nonlinear Schrödinger equation.* Numer. Math. **59** (1991) 31–53.
10. G. D. Akrivis: *Finite difference discretization of the Kuramoto–Sivashinsky equation.* Numer. Math. **63** (1992) 1–11.
11. G. D. Akrivis: *Finite difference discretization of the cubic Schrödinger equation.* IMA J. Numer. Anal. **13** (1993) 115–124.
12. O. Karakashian, G. D. Akrivis, V. A. Dougalis: *On optimal–order error estimates for the nonlinear Schrödinger equation.* SIAM J. Numer. Anal. **30** (1993) 377–400.
13. G. D. Akrivis, V. A. Dougalis, N. A. Kampanis: *On Galerkin methods for the wide–angle parabolic equation.* Journal of Computational Acoustics **2** (1994) 99–112.
14. G. D. Akrivis, V. A. Dougalis, N. A. Kampanis: *Error estimates for finite element methods for a wide–angle parabolic equation.* Appl. Numer. Math. **16** (1994) 81–100.
15. G. Akrivis, M. Crouzeix, V. Thomée: *Numerical methods for ultraparabolic equations.* Calcolo **31** (1994) 179–190.
16. G. Akrivis: *High–order finite element methods for the Kuramoto–Sivashinsky equation.* (RAIRO:) Math. Model. and Numer. Anal. **30** (1996) 157–183.
17. G. D. Akrivis, V. A. Dougalis, G. E. Zouraris: *Error estimates for finite difference methods for the wide–angle "parabolic" equation.* SIAM J. Numer. Anal. **33** (1996) 2488–2509.
18. G. Akrivis, V. A. Dougalis, O. Karakashian: *Solving the systems of equations arising in the discretization of some nonlinear p.d.e.'s by implicit Runge–Kutta methods.* (RAIRO:) Math. Model. and Numer. Anal. **31** (1997) 251–287.

19. G. Akrivis, M. Crouzeix, Ch. Makridakis: *Implicit–explicit multistep finite element methods for nonlinear parabolic problems.* Math. Comp. **67** (1998) 457–477.

20. G. Akrivis: *Finite difference methods for a wide–angle 'parabolic' equation.* SIAM J. Numer. Anal. **36** (1999) 317–329.

21. G. Akrivis, M. Crouzeix, Ch. Makridakis: *Implicit–explicit multistep methods for quasilinear parabolic equations.* Numer. Math. **82** (1999) 521–541.

22. G. D. Akrivis, V. A. Dougalis, G. E. Zouraris: *Finite difference schemes for the 'parabolic' equation in a variable depth environment with a rigid bottom boundary condition.* SIAM J. Numer. Anal. **39** (2001) 539–565.

23. G. D. Akrivis, V. A. Dougalis, O. A. Karakashian, W. R. McKinney: *Numerical approximation of blow-up of radially symmetric solutions of the nonlinear Schrödinger equation.* SIAM J. Scientific Computing **25** (2003) 186–212.

24. G. Akrivis, O. Karakashian, F. Karakatsani: *Linearly implicit methods for nonlinear evolution equations.* Numer. Math. **94** (2003) 403–418.

25. G. Akrivis, F. Karakatsani: *Modified BDF methods for nonlinear parabolic equations.* BIT Numer. Math. **43** (2003) 467–483.

26. G. Akrivis, M. Crouzeix: *Linearly implicit methods for nonlinear parabolic equations.* Math. Comp. **73** (2004) 613–635.

27. G. Akrivis, Ch. Makridakis: *Galerkin time–stepping methods for nonlinear parabolic equations.* (ESAIM:) Math. Model. and Numer. Anal. **38** (2004) 261–289.

28. G. Akrivis, Y. S. Smyrlis: *Implicit–explicit BDF methods for the Kuramoto–Sivashinsky equation.* Appl. Numer. Math. **51** (2004) 151–169.

29. G. Akrivis, S. Larsson: *Linearly implicit finite element methods for the time–dependent Joule heating problem.* BIT Numer. Math. **45** (2005) 429–442.

30. G. Akrivis, Ch. Makridakis, R. H. Nochetto: *A posteriori error estimates for the Crank–Nicolson method for parabolic equations.* Math. Comp. **75** (2006) 511–531.

31. G. Akrivis, Ch. Makridakis, R. H. Nochetto: *Optimal order a posteriori error estimates for a class of Runge–Kutta and Galerkin methods.* Numer. Math. **114** (2009) 133–160.

32. G. Akrivis, P. Chatzipantelidis: *A posteriori error estimates for the two-step backward differentiation formula method for parabolic equations.* SIAM J. Numer. Anal. **48** (2010) 109–132.

33. G. Akrivis, D. T. Papageorgiou, Y. S. Smyrlis: *Linearly implicit methods for a semilinear parabolic system arising in two–phase flows.* IMA J. Numer. Anal. **31** (2011) 299–321.

34. G. Akrivis, Y. S. Smyrlis: *Linearly implicit schemes for a class of dispersive–dissipative systems.* Calcolo **48** (2011) 145-172.

35. G. Akrivis, Ch. Makridakis, R. H. Nochetto: *Galerkin and Runge–Kutta methods*: *Unified formulation, a posteriori error estimates and nodal superconvergence.* Numer. Math. **118** (2011) 429–456.

36. G. Akrivis, D. T. Papageorgiou, Y.–S. Smyrlis: *Computational study of the dispersively modified Kuramoto–Sivashinsky equation.* SIAM J. Scientific Computing **34** (2012) A792–A813.

37. G. Akrivis: *Implicit–explicit multistep methods for nonlinear parabolic equations.* Math. Comp. **82** (2013) 45–68.

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38. G. Akrivis, D. T. Papageorgiou, Y.–S. Smyrlis: *On the analyticity of certain dispersive–dissipative systems.* Bull. London Math. Soc. **45** (2013) 52–60.

39. G. Akrivis: *Stability of implicit–explicit backward difference formulas for nonlinear parabolic equations.* SIAM J. Numer. Anal. **53** (2015) 464–484.

40. G. Akrivis, Ch. Lubich: *Fully implicit, linearly implicit and implicit–explicit backward difference formulae for quasi-linear parabolic equations.* Numer. Math. **131** (2015) 713–735.

41. G. Akrivis, A. Kalogirou, D. T. Papageorgiou, Y.–S. Smyrlis: *Linearly implicit schemes for multi-dimensional Kuramoto–Sivashinsky type equations arising in falling film flows.* IMA J. Numer. Anal. **36** (2016) 317–336.

42. G. Akrivis, E. Katsoprinakis: *Backward difference formulae*: *New multipliers and stability properties for parabolic equations.* Math. Comp. **85** (2016) 2195–2216.

43. G. Akrivis: *Stability properties of implicit–explicit multistep methods for a class of nonlinear parabolic equations.* Math. Comp. **85** (2016) 2217–2229.

44. G. Akrivis, Y.–S. Smyrlis: *Backward difference formulae for Kuramoto–Sivashinsky type equations.* Calcolo (2017) DOI 10.1007/s10092-016-0205-0

45. G. Akrivis, B. Li, Ch. Lubich: *Combining maximal regularity and energy estimates for time discretizations of quasilinear parabolic equations.* Math. Comp. **86** (2017) 1527–1552.

46. G. Akrivis, B. Li: *Maximum norm analysis of implicit–explicit backward difference formulae for nonlinear parabolic equations.* IMA J. Numer. Anal. (2017) doi:10.1093/imanum/drx008

47. G. Akrivis: *Stability of implicit and implicit–explicit multistep methods for nonlinear parabolic equations.* IMA J. Numer. Anal. (2017) doi:10.1093/imanum/drx057

- **Publications in Proceedings of Conferences**.

i. G. Akrivis: *Die Fehlernorm spezieller Gauss–Quadraturformeln.* In: Constructive Methods for the Practical Treatment of Integral Equations, International Series of Numerical Mathematics **73**, 1985, pp. 13–19.

ii. G. D. Akrivis, V. A. Dougalis: *On a high-order accurate Galerkin–type full discretization of the Schrödinger equation.* In: Proceedings of the 9th Conference on Problems and Methods in Mathematical Physics (F. Kuhnert and B. Silbermann, eds.), Teubner–Texte zur Mathematik **111**, Leipzig 1988, pp. 18–26.

iii. G. D. Akrivis, V. A. Dougalis: *On a conservative, high-order finite element scheme for the "parabolic" equation.* In: Computational Acoustics – Volume 1 (Proceedings of the second IMACS Symposium on Computational Acoustics, Princeton University, D. Lee, A. Cakmak and R. Vichnevetsky, eds.), Elsevier–North Holland, 1989, pp. 17–26.

iv. G. D. Akrivis, V. A. Dougalis: *On a conservative finite difference method for the third-order, wide–angle parabolic equation.* In: Computational Acoustics: Acoustic Propagation – Volume 2 (Proceedings of the third IMACS International Symposium on Computational Acoustics, Harvard University, D. Lee, R. Vichnevetsky and A. R. Robinson, eds.), North–Holland, 1993, pp. 209–220.

v. G. D. Akrivis, V. A. Dougalis, O. A. Karakashian: *Numerical methods for the nonlinear Schrödinger equation.* In: Advances in Computer Methods for Partial Differential Equations (R. Vichnevetsky, D. Knight and G. Richter,eds.), 1992 IMACS, pp. 1–7.

vi. G. D. Akrivis, V. A. Dougalis, N. A. Kampanis: *On finite element approximations of the wide-angle parabolic equation.* In: Advances in Computer Methods for Partial Differential Equations (R. Vichnevetsky, D. Knight and G. Richter,eds.), 1992 IMACS, pp. 8–14.

vii. G. D. Akrivis, V. A. Dougalis, N. A. Kampanis: *On finite element methods for interface problems in underwater acoustics.* In: Proceedings of the 1st National Congress on Computational Mechanics, Athens (D. E. Beskos, ed.), 1992, University of Patras Press, pp. 863–870.

viii. G. D. Akrivis, V. A. Dougalis, O. A. Karakashian, W. R. McKinney: *Galerkin–finite element methods for the nonlinear Schrödinger equation.* In: Hellenic Research in Mathematics and Informatics '92 (E. A. Lipitakis, ed.), Hellenic Mathematical Society, pp. 421–442, Also in: Advances on Computer Mathematics and its Applications, World Scientific, Singapore, 1993, pp. 85–106.

ix. G. D. Akrivis: *Finite element discretization of the Kuramoto–Sivashinsky equation.* Numerical Analysis and Mathematical Modelling, Banach Center Publications **29** (1994) 155–163.

x. G. D. Akrivis, V. A. Dougalis, O. A. Karakashian, W. R. McKinney: *Numerical approximation of singular solutions of the damped nonlinear Schrödinger equation.* In: Proceedings of the ENUMATH 97, 2nd European conference on numerical mathematics and advanced applications, Heidelberg, Germany, 1997, ed. by H. G. Bock, F. Brezzi, R. Glowinski, G. Kanschat, Y. A. Kuznetsov, J. Periaux, R. Rannacher, World Scientific, Singapore, 1998, pp. 117–124.

Books

- G. D. Akrivis, V. A. Dougalis: *Introduction to Numerical Analysis.* Crete University Press, Heraklion, 1997 (1^{st} printing: 1998, 2^{nd} print.: 2000, 3^{rd} print.: 2002, 2^{nd}, revised ed.: 2004, 1^{st} printing: 2005, 2^{nd} print.: 2006, 3^{rd} ed.: 2008, 1^{st} printing: 2009, 4^{th} ed.: 2010, 1^{st} printing: 2011, 2^{nd} print.: 2013, 3^{rd} print.: 2014, 4^{th} print.: 2015, 5^{th} print.: 2017) (in Greek).
- G. D. Akrivis, V. A. Dougalis: *Numerical Methods for Ordinary Differential Equations.* Crete University Press, Heraklion, 2006 (2^{nd} ed.: 2013, 1^{st} printing: 2015) (in Greek).
- G. D. Akrivis, N. D. Alikakos: *Partial Differential Equations.* Synchroni Ekdotiki Publications, Athens, 2012 (2^{nd} ed.: 2017) (in Greek).

Courses Taught

1. At the University of Ioannina
   - *for undergraduates*: Introduction to Numerical Analysis, Computational Mathematics, Numerical methods for ordinary differential equations.
   - *for graduates*: Applied Functional Analysis, Numerical methods for partial differential equations, Numerical Analysis, Numerical methods for differential equations.
2. At the University of Crete
   - *for undergraduates*: Introduction to Numerical Analysis, Numerical Linear Algebra, Numerical methods for o.d.e's, Approximation Theory, Finite difference methods for p.d.e's, Calculus I and III, Advanced Calculus, Linear Algebra I, Functional Analysis, Partial Differential Equations.
   - *for graduates*: Numerical Analysis, Galerkin/Finite element methods for elliptic problems, Numerical treatment of p.d.e's, Generalized solutions of p.d.e's, Numerical treatment of initial– and boundary–value problems, Spectral methods for p.d.e's, Finite difference methods for p.d.e's.
3. At the University of Tennessee
   - Calculus I, II and III (for undergraduates).

4. At the University of Cyprus
   - Linear Algebra I, General Mathematics, Partial Differential Equations, Numerical Analysis II, Calculus , Approximation Theory (for undergraduates), Finite Element Methods (for undergraduates and graduates).
5. At the Basque Center for Applied Mathematics (BCAM)
   - Numerical Methods for initial value problems (for graduate students and postdoctoral researchers).