CURRICULUM VITAE

Peter A. Forsyth

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EDUCATION:

1977-79	Ph.D. University of Western Ontario London, Ontario, Canada
1975-77	M.Sc. Australian National University Canberra, Australia
1971-75	B.Sc. University of Western Ontario London, Ontario, Canada

EXPERIENCE:

2016 - present	Emeritus Professor Cheriton School of Computer Science, University of Waterloo, Waterloo, Ontario, Canada.
1993 - 2016	Professor Cheriton School of Computer Science, University of Waterloo
2009 - 2011	Associate Director (Computing and Infrastructure) Cheriton School of Computer Science University of Waterloo
2006 - 2008	Scientific Director Institute for Quantitative Finance and Insurance University of Waterloo
2002 - 2005	Associate (Vice) Director Cheriton School of Computer Science University of Waterloo

1995 - 1998	Director Institute for Computer Research University of Waterloo
1991 - 1993	Associate Chair (Graduate Studies) Department of Computer Science University of Waterloo
1987 - 1993	Associate Professor Department of Computer Science, University of Waterloo
1985 - 1987	President Dynamic Reservoir Systems, Calgary, Alberta, Canada.
1979 - 1985	Senior Simulation Scientist (and other positions) Computer Modelling Group, Calgary, Alberta, Canada.

Research Interests

Computational finance, numerical methods for optimal stochastic control, sparse matrix algorithms, nonlinear partial integro-differential equations.

Courses Taught

Undergraduate courses

- Introduction to Scientific Computing. Third year course covers interpolation, FFT and application to image processing and compression, numerical linear algebra, ordinary differential equations. Matlab based.
- Numerical Linear Algebra. Fourth year/graduate course covers sparse matrix data structures, basic graph theory, direct methods, ordering, iterative methods. C++ based.
- Numeric Computation for Dynamical Simulation. Fourth year/graduate course, covers numerical algorithms for solution of differential equations in the context of simulation models. Runge-Kutta, BDF methods, DAE's, application to electronic circuits.
- Applications Software Engineering. Fourth year non-specialist course covers software design, testing, maintenance, configuration control. Use of tools, case studies.

Graduate courses

- Numerical Solution of Partial Differential Equations. Finite volume, finite element methods, M-matrices, LED discretizations, shocks, flux limiters.

- Preconditioners for Sparse Matrices. GMRES, CGSTAB, QMR acceleration. Incomplete factorization, level of fill, drop tolerance, applications.
- CFD Applications. Computational methods for high speed compressible flow, incompressible Navier-Stokes, multiphase subsurface flow.
- Computational Finance. Monte Carlo methods, low discrepancy sequences, finite volume PDE methods, techniques for drift-dominated real options, path-dependent options (Asian, shout, Parisian), discrete delta, gamma hedging simulation, penalty methods for American options.

Short courses

- Real options and finance: optimal stochastic control formulation and solution techniques. Seven hours of lectures, co-taught with Margaret Insley. Coruna, Spain, 2015.
- Numerical methods for Hamilton Jacobi Bellman equations in finance. This research level mini-course (eight hours of lectures) has been given in Singapore (2009), the Netherlands (2010), Vienna (2012), Coruna (Spain, 2012), Singapore (2013), Amsterdam (2015).
- Numerical PDE methods for path dependent options. Two day short course, combines lectures and Matlab exercises. Co-taught with Ken Vetzal. This course has been given in New York City (2001, 2003, 2004, 2005), Tokyo (2001), Toronto (2002), Ithaca, NY (2001, 2002) and Waterloo (2006, 2007, 2009, 2010).
- Convertible bonds: pricing theory and algorithms. One day short course, lectures and software demonstrations. Co-taught with Ken Vetzal, Elie Ayache. Given in New York City (2003), Paris (2004).

Commercially Developed Software

Dynamic Reservoir Simulator (developed with P.H. Sammon, A. Behie). Black oil reservoir simulation model for primary production, waterflooding, and coning. Duke Energy currently supports and markets this software. This package has been purchased by over thirty petroleum companies.

IMEX (developed with A. Behie, P.H. Sammon). Adaptive implicit black oil model. This code continues to be marketed and supported by the Computer Modelling Group, Calgary. Over 200 licenses sold.

Licensed Software Developed at Waterloo

WATSIT (developed with J. Kightley, S. Clift, E. D'Azevedo). Iterative sparse matrix solution package. This library has been purchased by such organizations as: HydroGeoLogic Inc. (Herndon, VA), Westinghouse Hanford (Richland, WA), Boeing (Seattle),

Los Alamos National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratory, Phillips Petroleum (Bartlesville), TRW Safety Systems (Los Vegas), Desert Research Institute (Los Vegas), and Atomic Energy of Canada (Pinawa). This software has also been distributed to a number of academic sites.

PCG5 This sparse iterative solver is embedded in simulation software (Visual Modflow, Modflow Surfact) developed by HydroGeoLogic Inc (Herndon, VA). Since 2005, about 100 licenses have been sold.

Consulting Experience

Research related consulting for such organizations as: Aquanty Inc. (Waterloo), TGINet/Cornell (Tokyo), SunLife of Canada, NOVA Corporation (Calgary), the Electric Power Research Institute (Mountain View, CA), Smithville Bedrock Remediation Corporation (Smithville Ont.), Los Alamos National Laboratory, Phillips Petroleum (Bartlesville), US Environmental Protection Agency, Oak Ridge National Laboratory, Lawrence Berkeley National Laboratory, NASA ICASE (Langley, VA), and HydroGeoLogic (Herndon, VA).

Editorial Boards

- Journal of Computational Finance (Editor-in-Chief, 2008-2013, Associate Editor, 2003-2008, 2013-)
- Applied Mathematical Finance (Associate Editor, 2004-)
- Encyclopedia of Quantitive Finance (section co-editor (with D. Lamberton), PDEs and Numerical Methods, 2007-2008).
- Applied Numerical Mathematics (guest co-editor, special issue on Iterative Methods, 2008).
- Advances Water Resources (Associate Editor, 1998-2001)

Recent Research Service

- Member, organizing commitee, SIAM Conference on Financial Mathematics and Engineering, Austin, 2016.
- Member, MITACS Research Management Committee (2008-11).
- Scientific Director, Institute for Quantitative Finance and Insurance (Waterloo, now WATRISQ, 2006-2008).
- Member of organizing committee, Fields Institute numerical analysis year (2001-2002).
- NSF Panel member (*Computational Mathematics* (2001)).
- Grant selection committee member, CITO, *Modelling and simulation*, 1998-2000.

- Director, Insitute for Computer Research (Waterloo, 1995-1998). Organized over twenty-five short courses with industrial participants; also coordinated Waterloo submissions to ORDCF and CFI related to Bell Canada University Laboratory research initiative (total funding received from Bell, ORDCF and CFI in excess of $20 million over three years).

- Workshops, Conferences Co-organized

  - Conference on Computational Methods in Finance, University of Waterloo, July, 2007
  - Workshop on Real Options in Telecommunications, University of Waterloo, May 2003
  - Workshop on Computational Methods and Applications in Finance, Fields Institute, University of Toronto, February 2002

Graduate Student Supervision

PhD

K. Ma (2015)
S.T. Tse (2012, co-supervisor J. Wan)
Y. Huang (2011)
J. Wang (2010)
Z. Chen (2008)
A. Belanger (2008, co-supervisor G. Labahn)
S. Kennedy (2007, co-supervisor G. Labahn)
S. Clift (2007)
Y. d'Halluin (2004)
H. Windcliff (2003)
D. Pooley (2003)
R. Zvan (2000, co-supervisor K. Vetzal)
A. Unger (1995, co-supervisor E. Sudicky)

MMath

C. Shan (2014, co-supervisor G. Labahn)
J. Lippa (2013, co-supervisor G. Labahn)
A. Asare (2013, co-supervisor G. Labahn)
P. Azimzadeh (2013)
H. Su (2013, co-supervisor G. Labahn)
M. Ma (2013, co-supervisor G. Labahn)
X. Peng (2013)
Z. Wang (2012, co-supervisor G. Labahn)
X. Guan (2012)
C. Morley (2011, co-supervisor G. Labahn)
J. Babbin (2011, co-supervisor G. Labahn)
D. Fagnan (2011, co-supervisor G. Labahn)
Y. Sohrabi (2011)
W. Xiao (2010)
D. Saraph (2010, co-supervisor G. Labahn)
B. Wang (2010)
J. Aquan-Asee (2009, co-supervisor G. Labahn)
M. Yu (2007)
J. Kraus (2007, TU Munich, co-supervisors, Zagst, Grau)
L. Xiao (2006, co-supervisor, K. Vetzal)
J. Wang (2005)
P. Lizak (2004)
A. Grau (2003)
C. Cheng (2002)
M.C. Lam (2002)
W. Morland (2001)
H. Windcliff (2000)
Y. d'Halliun (2000, co-supervisor G. Labahn)

M. Fitzgerald(1999)
D. Pooley(1999, co-supervisor R.B. Simpson)
L. Wang (1998)
T. Zvi (1998)
E. Carr (1997)
S. Friedman (1996)
H. Li (1996)
R. Zvan (1996)
B.Y. Shao (1994)
S. Clift (1993)
Y. Qian (1993)
J. Dickinson (1993)
P. Chin (1991, co-supervisor W.L. Seward)
M.C. Kropinski (1990)
F.W. Letniowski (1989)
T. Natalisa (1988)
W.S. Nugroho (1988)

Students Currently Supervised

Pieter van Staden (joint with Dang) (PhD)

PhD Examining Committees

N. Leung(CS, Toronto) 2017.
F. Cong (Mathematics, Delft) 2016.
B. Kimmel (CS) 2016.
A. Rajabi (CS) 2016.
S. Amarala (CS) 2015.
O. Ardakanian (CS) 2015.
M. Ruijter (Mathematics, Delft) 2015.
K. Zhou (Systems Engineering, CUHK) 2014.
A. Tayal (CS) 2014.
K. Miller (Applied Mathematics) 2012.
J. Witte (Mathematics, Oxford) 2012.
H.T. Hwang (Earth Sciences) 2012.
V. Surkov (CS, Toronto) 2009.
A. Rohani (ECE) 2006.
H. Li (Mathematics, Calgary) 2006.
R. Maji (Earth Sciences) 2005.
M. Steigleider (CS) 2005.
M. Ayatollah (ECE) 2004.
K. Lau (Computer Science, UHKST) 2004.
A. Borji (ECE) 2004.
W. Annable (Earth Sciences) 2003.
Y. Wang (ECE) 2000.
V. Van (ECE) 1999.
J. VanderKwaak (Earth Sciences) 1999.
P. Zwart (Mechanical Engineering) 1999.
J. Grad (Applied Mathematics) 1997.
K. MacQuarrie (Earth Sciences) 1997.
L. Zhang (Earth Sciences) 1997.
I. Murray (Applied Math) 1994.
M. Ibaraki (Earth Sciences) 1994.
C. Mendoza (Earth Sciences) 1992.
R. Heywood (Mechanical Engineering) 1992.
R. Therrien (Earth Sciences) 1992.
A. Bajor (Chem. Eng.,Toronto) 1990.
S. Ormiston (Mechanical Engineering) 1990.
W. Drennan (Applied Mathematics) 1988.
E. Fraga (CS) 1988.

Administrative Duties

Member, Business at Waterloo Committee (2016)
Member, School Advisory Commitee on Appointments (2015-2016)
Member, Director Search Committee, School of Accounting and Finance (2015)
Member, UW Pension and Benefits Committee (2014-2016)
Member, UW Registered Pension Plan Investment Commitee (2014-2016)

Member, Faculty Association Academic Freedom and Tenure Committee (2012-2016)
Member, School Advisory Commitee on Appointments (2011-2012)
Member, CS Graduate Committee (2011-14)
Member, University Senate (2010-2012)
Member, University Committee on Information Systems and Technology (2009-10).
Chairman, CS Computing Facility Committee (2009-2011).
Member, Engineering Faculty Promotion and Tenure Committee (2007-08).
Scientific Director, Institute for Quantitative Finance and Insurance (2006-2008).
Associate Director, Computing and Financial Management Program (2005-2008).
Member, School of Computer Science Promotion and Tenure Committee (2005-07, 2009-10).
Member, School of Computer Science Director Selection Committee (2005).
Member, Dean of Mathematics Selection Committee (2004-2005).
Member, University Senate (2004-2007).
Associate Director, School of Computer Science (2002-2005).
Member, External Relations Committee (2002-2005).
Member, CS Computing Facility Committee (2002-2005).
Member, CS Budget Committee (2002-2005).
Member, Science Faculty Promotion and Tenure Committee (2001-2002).
Member, Computer Science Governance Committee (2001).
Member, Eyton Chair selection Committee (2000-2001).
Member, Mathematics Faculty Promotion and Tenure Committee (1998-2001)
Member, Graduate Committee (CS) (1997-2002)
Member, Engineering Faculty Promotion and Tenure Committee, (1996-97)
Member, Chair selection Committee (CS), (1996-1997).
Member, Promotion and Tenure Committee(CS) (1995-97)
Director, Institute for Computer Research (1995-98)
Associate Chairman, Graduate Studies (1991 - 1993)
Chairman, Graduate Committee (CS) (1991 - 1993)
Member, Promotion and Tenure Committee (CS) (1991 - 1992)
Member, Graduate Committee (CS) (1990-91)
Chairman, PhD Comprehensive Committee (1989-90)
Member, PhD Comprehensive Committee (1988-89)
Member, Curriculum Committee, (1987-90)
Member, Graduate Committee (Applied Mathematics) (1987-90)

Research Grants

2017-2022 NSERC Discovery grant. $43,000/year.

2016-2018 Global Risk Institute. A multi-period mean-variance approach to risk and return in climate change policy. $60,000 per year (with M. Insley (PI)).

2013-2016 Global Risk Institute. Long-horizon and longevity risks in insurance. $188,000 per year (with K.S. Tan (PI), T. Coleman, M. Hardy, J. Li).

2012-2015 NSERC Collaborative Research and Development (CRD). Matching for Scotiabank grant. $38,000 per year (co-PI with G. Labahn).

2011-2014 Scotiabank. Implied Volatility Surfaces, Local Volatility Models and Low Dimensional Hedging Strategies for Arithmetic and Geometric Baskets. $25,000/year (co-PI with G. Labahn).

2010-2015 NSERC Discovery grant. $40,000/year. (Deferred to end in 2017).

2009-2012 Credit Suisse Research Grant $70,200/year (co-PI with Y. Li and A. Heunis).

2008-2011 Tata Consultancy Services Research Grant. $25,000/year (co-PI with G. Labahn).

2006-2011 Morgan Stanley Equity Market Microstructure Research Grant. $20,000/year.

2005-2010 NSERC Discovery grant. $64,000/year.

2003-2005 ITO33, Paris. Numerical methods for jump diffusion and jump volatility models, $23,000/year (co-PI with K. Vetzal).

2001-2005 NSERC Discovery grant. $57,000/year.

2000-2003 Bell Canada University Labs. Computational Finance: Real options, telecommunications, and corporate finance $135,000/year (co-PI) (with K. Vetzal(co-PI), P. Boyle, G. Labahn, K.S. Tan).

1999-2002 NSERC Strategic, Royal Bank. Computational Finance: algorithms for option pricing and hedging. $128,000/year (PI) (with K. Vetzal, P. Boyle, G. Labahn).

1998-2001 NSERC Strategic. New computational approaches for modelling surface water-groundwater systems. $131,000/year (with E. Sudicky (PI), E. Frind, N. Kouwen, D. Rudolph, R. Soulis, J. Sykes, H. Whiteley).

1998-2000 CITO. Computational support for modelling in Engineering & Finance.$50,000 /year (with W.P. Tang, R.B. Simpson, A. George, P. Boyle, K. Vetzal).

1997-2001 NSERC operating grant. $45,000/year.

1996-98 Smithville Environmental Restoration Project, ITRC and WCGR. Simulation of DNAPL contaminants in fractured rock. $60,000/year (with E. Sudicky).

1995-1998 US EPA. Simulation of groundwater flow at the Smithville site. $80,000/year (with E. Sudicky (PI), K. Novakowski).

1995-1998 Information Technology Research Center. Research into numerical solution of partial differential equations. $75,000/year (with A. George, R. Simpson, W.P. Tang).

1995 Haley and Aldrich (Boston), Gartner-Lee (Markham), Waterloo Center for Groundwater Research. Simulation and video animation of NAPL extraction methods. $29,000 (with E. Sudicky).

1995 Solvents in Groundwater Consortium. Simulation of vacuum extraction methods for VOC's. $20,000 (with E. Sudicky).

1994 Waterloo Center for Groundwater Research. Visualization of DNAPL contamination. $13,600 (with E. Sudicky).

1994 NSERC Equipment Grant. Video recording equipment for scientific visualization. $42,000 (with R.H. Bartels).

1993 Solvents in Groundwater Consortium. Three dimensional simulation of NAPL contamination. $19,000 (with E. Sudicky).

1993-1995 Information Technology Research Center. Research into numerical solution of partial differential equations. $40,000/year (with R. Simpson, W.P. Tang).

1993-1997 NSERC operating grant. $28,000/year.

1990-1993 NSERC operating grant. $25,000/year.

1988-1990 NSERC operating grant. $23,000/year.

1988-1992 Information Technology Research Center. Research into numerical solution of partial differential equations. $80,000/year (with R. Simpson, W.P. Tang, W.L. Seward).

1985 Energy Mines and Resources. Development of new software technology for reservoir simulation. $80,000 (with A. Behie, P. Sammon).

List of Research Contributions - Peter A. Forsyth

Refereed Journal Publications

1. P.A. Forsyth and K.R. Vetzal, *"Robust asset allocation for long-term target-based investing,"* International Journal of Theoretical and Applied Finance 20:3 (2017) 1750017 (electronic).

2. K. Ma, P.A. Forsyth *"An unconditionally monotone numerical scheme for the two factor uncertain volatility model,"* IMA Journal of Numerical Analysis 37 (2017) 905-944.

3. D.M. Dang, P.A. Forsyth, K.R. Vetzal, *"The 4% strategy revisited: A pre-commitment optimal mean-variance approach to wealth management,"* Quantitative Finance 17 (2017) 335-351.

4. P. Azimzadeh, P.A. Forsyth, *"Weakly chained matrices and impulse control,"* SIAM Journal on Numerical Analysis 54 (2016) 1341-1364.

5. C. Reisinger, P.A. Forsyth, *"Piecewise constant policy approximations to Hamilton-Jacobi-Bellman equations,"* Applied Numerical Mathematics 103 (2016) 27-47.

6. K. Ma, P.A. Forsyth, *"Numerical solution of the Hamilton-Jacobi-Bellman formulation for continuous time mean variance asset allocation under stochastic volatility,"* Journal of Computational Finance 20:1 (2016) 1-37.

7. D.M. Dang, P.A. Forsyth, Y. Li, *"Convergence of the embedded mean-variance optimal points with discrete sampling,"* Numerische Mathematik 132 (2016) 271-302.

8. D.M. Dang, P.A. Forsyth, *"Better than pre-commitment mean-variance portfolio allocation strategies: a semi-self-financing Hamilton-Jacobi-Bellman equation approach,"* European Journal of Operational Research 250 (2016) 827-841.

9. P. Azimzadeh, P.A. Forsyth, *"The existence of optimal bang-bang controls for GMxB contracts,"* SIAM Journal on Financial Mathematics 6 (2015) 117-139.

10. H.-T. Hwang, Y.-J. Park, E.A. Sudicky, P.A. Forsyth *" A parallel computational framework to solve flow and transport in integrated surface-subsurface hydrologic systems,"* Environmental Modelling and Software 61 (2014) 39-58.

11. P.A. Forsyth, K.R. Vetzal *"An optimal stochastic control framework for determining the cost of hedging of variable annuities,"* Journal of Economic Dynamics and Control 44 (2014) 29-53.

12. S.T. Tse, P.A. Forsyth, Y. Li, *"Preservation of scalarization optimal points in the embedding technique for continuous time mean variance optimization,"* SIAM Journal on Control and Optimization 52 (2014) 1527-1546.

13. D.M. Dang, P.A. Forsyth *"Continuous time mean-variance optimal portfolio allocation under jump diffusion: a numerical impulse control approach,"* Numerical Methods for Partial Differential Equations 30 (2014) 664-698.

14. J. Babbin, P.A. Forsyth, G. Labahn, *"A comparison of iterated optimal stopping and local policy iteration for American options under regime switching,"* Journal of Scientific Computing 58 (2014) 409-430.

15. S.T. Tse, P.A. Forsyth, J.S. Kennedy, H. Windcliff, *"Comparison between the mean variance optimal and mean quadratic variation optimal trading strategies,"* Applied Mathematical Finance 20 (2013) 415-449.

16. Y. Huang, P.A. Forsyth, G. Labahn, *"Inexact arithmetic considerations for direct control and penalty methods: American options under jump diffusion,"* Applied Numerical Mathematics 72 (2013) 33-51.

17. P.A. Forsyth, J.S. Kennedy, S.T. Tse, H. Windcliff, *"Optimal trade execution: a mean quadratic variation approach,"* Journal of Economic Dynamics and Control 36 (2012) 1971-1991.

18. Y. Huang, P.A. Forsyth, G. Labahn, *"Combined fixed point and policy iteration for HJB equations in finance,"* SIAM Journal on Numerical Analysis 50 (2012) 1849-1860.

19. Y. Huang, P.A. Forsyth, G. Labahn, *"Iterative methods for the solution of a singular control formulation of a GMWB pricing problem,"* Numerische Mathematik 122 (2012) 133-167.

20. J. Wang and P.A. Forsyth, *"Comparison of mean variance like strategies for optimal asset Allocation problems."* International Journal of Theoretical and Applied Finance 15:2 (2012) (33 pages: DOI: 10.1142/S0219024912500148).

21. I. Huang and P.A. Forsyth, *"Analysis of a penalty method for pricing a Guaranteed Minimum Withdrawal Benefit (GMWB)."* IMA Journal on Numerical Analysis 32 (2012) 320-351.

22. Y. Huang, P.A. Forsyth, G. Labahn, *"Methods for American options under regime switching,"* SIAM Journal on Scientific Computing 33 (2011) 2144-2168.

23. P.A. Forsyth, *"A Hamilton Jacobi Bellman approach to optimal trade execution."* Applied Numerical Mathematics 61 (2011) 241-265.

24. J. Wang and P.A. Forsyth, *"Continuous time mean variance asset allocation: a time consistent strategy."* European Journal of Operational Research 209 (2011) 184-201.

25. Z. Chen, P.A. Forsyth *"Implications of a regime-switching model on natural gas storage valuation and optimal operation,"* Quantitative Finance 10 (2010) 159-176.

26. J. Wang, P.A. Forsyth. *"Numerical solution of the Hamilton Jacobi Bellman Formulation for continuous time mean variance asset allocation."* Journal of Economic Dynamics and Control 34 (2010) 207-230.

27. A. C. Belanger, P.A. Forsyth, G. Labahn, *"Valuing the guaranteed minimum death benefit clause with partial withdrawals,"* Applied Mathematical Finance 16 (2009) 451-496.

28. J.S. Kennedy, P.A. Forsyth, K.R. Vetzal, *"Dynamic hedging under jump diffusion with transaction costs,"* Operations Research 57 (2009) 541-559.

29. Y. Huang, P.A. Forsyth, K.R. Vetzal, *"Valuing guarantees on spending funded by endowments,"* Canadian Applied Mathematics Quarterly 17 (2009) 661-702.

30. Z. Chen, K.R. Vetzal, P.A. Forsyth, *"The effect of modelling parameters on the Value of GMWB Guarantees,"* Insurance: Mathematics and Economics 43 (2008) 165-173.

31. A.C. Belanger, P.A. Forsyth, *"Infinite reload options: pricing and analysis,"* Journal of Computational and Applied Mathematics 222 (2008) 54-81.

32. Z. Chen, P.A. Forsyth, *"A Numerical scheme for the impulse control formulation for pricing variable annuities with a Guaranteed Minimum Withdrawal Benefit (GMWB),"* Numerische Mathematik 109 (2008) 535-569.

33. S.S. Clift, P.A. Forsyth, *"Numerical solution of two asset jump diffusion models,"* Applied Numerical Mathematics 58 (2008) 743-782.

34. J. Wang, P.A. Forsyth, *"Maximal use of central differencing for Hamilton-Jacobi-Bellman PDEs in Finance,"* SIAM Journal on Numerical Analysis 46 (2008) 1580-1601.

35. Y.S. Wu, P.A. Forsyth, *"Efficient schemes for reducing numerical dispersion in modeling multiphase transport through porous and fractured Media,"* Vadose Zone Journal 7 (2008) 340-349.

36. Z. Chen, P.A. Forsyth, *"A semi-Lagrangian approach for natural gas storage valuation and optimal operation,"* SIAM Journal on Scientific Computing 30 (2007) 339-368.

37. P.A. Forsyth, G. Labahn, *"Numerical methods for controlled Hamilton-Jacobi-Bellman PDEs in finance,"* Journal of Computational Finance 11:2 (2007/2008: Winter) 1-44.

38. I.R. Wang, J.W.I. Wan, P.A. Forsyth, *"Robust numerical valuation of European and American options under the CGMY process,"* Journal of Computational Finance 10:4 (2007: Summer) 31-69.

39. H. Windcliff, J. Wang, P.A. Forsyth, K. Vetzal, *"Hedging with a correlated asset: solution of a nonlinear pricing PDE,"* Journal of Computational and Applied Mathematics 200 (2007) 86-115.

40. Y. d'Halluin, P.A. Forsyth, K.R. Vetzal, *"Wireless network capacity investment,"* European Journal of Operational Research 176 (2007) 584-609.

41. C. He, J.S. Kennedy, T. Coleman, P.A. Forsyth, Y. Li, K. Vetzal, *"Calibration and hedging under jump diffusion,"* Review of Derivatives Research 9 (2006) 1-35.

42. H. Windcliff, P.A. Forsyth, K.R. Vetzal, *"Numerical methods and volatility models for valuing cliquet options,"* Applied Mathematical Finance 13 (2006) 353-386.

43. H. Windcliff, P.A. Forsyth, K.R. Vetzal, *"Pricing methods and hedging strategies for volatility derivatives,"* Journal of Banking and Finance 30 (2006) 409-431.

44. Y. d'Halluin, P.A. Forsyth, G. Labahn, *"A semi-Lagrangian approach for American Asian options under jump diffusion,"* SIAM Journal on Scientific Computing 27 (2005) 315-345.

45. Y. d'Halluin, P.A. Forsyth, K.R. Vetzal, *"Robust numerical methods for contingent claims under jump diffusion processes,"* IMA Journal on Numerical Analysis 25 (2005) 87-112.

46. H. Windcliff, P.A. Forsyth, K.R. Vetzal, *"Analysis of the stability of the linear boundary condition for the Black-Scholes equation,"* Journal of Computational Finance, 8:1 (Fall, 2004) 65-92.

47. Y. d'Halluin, P.A. Forsyth, G. Labahn, *"A penalty method for American options with jump diffusion processes,"* Numerische Mathematik, 97:2 (2004) 321-352.

48. R. Zvan, P.A. Forsyth, K.R. Vetzal, *"Negative coefficients in two factor option pricing models,"* Journal of Computational Finance, 7:1 (Fall, 2003) 37-73.

49. E. Ayache, P.A. Forsyth, K.R. Vetzal, *"The valuation of convertible bonds with credit risk,"* Journal of Derivatives, 11 (Fall, 2003) 9-29.

50. D.M. Pooley, K.R. Vetzal, P.A. Forsyth *"Remedies for non-smooth payoffs in option pricing,"* Journal of Computational Finance, 6:4 (Summer, 2003) 25-40.

51. D.M. Pooley, P.A. Forsyth, K.R. Vetzal, *"Numerical convergence properties of option pricing PDEs with uncertain volatility,"* IMA Journal on Numerical Analysis, 23 (2003) 241-267.

52. H. Windcliff, K.R. Vetzal, P.A. Forsyth, A. Verma, T. Coleman, *"An object oriented framework for valuing shout options on high-performance architectures,"* Journal of Economic Dynamics and Control, 27 (2003) 1133-1161.

53. P.A. Forsyth, K.R. Vetzal, R. Zvan, *"Convergence of Lattice and PDE methods for valuing path dependent options using interpolation,"* Review of Derivatives Research, 5 (2002) 273-314.

54. Y. d'Halluin, P.A. Forsyth, K.R. Vetzal, *"Managing telecommunication networks under uncertainty,"* IEEE/ACM Transactions on Networking, 10 (2002) 579-588.

55. H. Windcliff, P.A. Forsyth, M.K. Le Roux, K.R. Vetzal, *"Understanding the behaviour and hedging of segregated funds offering the reset feature,"* North American Actuarial Journal, 6 (2002) 107-125.

56. P.A. Forsyth, K.R. Vetzal, *"Quadratic convergence for valuing American options using a penalty method,"* SIAM Journal on Scientific Computing, 23 (2002) 2095-2122.

57. Y. d'Halluin, P.A. Forsyth, K.R. Vetzal, G. Labahn, *"A numerical PDE approach for pricing callable bonds,"* Applied Mathematical Finance, 8 (2001) 49-77.

58. H.A. Windcliff, P.A. Forsyth, K.R. Vetzal, *"Valuation of segregated funds: shout options with maturity extensions,"* Insurance: Mathematics and Economics, 29 (2001) 1-21.

59. H. Windcliff, P.A. Forsyth, K.R. Vetzal, *"Shout options: a framework for pricing contracts which can be modified by the investor,"* Journal of Computational Applied Mathematics, 134 (2001) 213-241.

60. R. Zvan, P.A. Forsyth, K.R. Vetzal, *"A finite volume approach for contingent claims valuation,"* IMA Journal on Numerical Analysis 21 (2001) 703-731.

61. Y.S. Wu, P.A. Forsyth, *"On the selection of primary variables in the numerical formulation for modelling multiphase flow in porous media,"* Journal of Contaminant Hydrology, 48 (2001) 277-304.

62. P.A. Forsyth, K.R. Vetzal, *"Implicit solution of uncertain volatility/transaction cost option pricing models with discretely observed barriers,"* Applied Numerical Mathematics 36 (2001) 427-445.

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