CURRICULUM VITAE

PERSONAL DATA

Richard Bruce Simpson	telephone	Office	(519) 888-4567 ; extn 4469
Canadian Citizen		Home	(519) 747-9429
Born May 26, 1940		Fax	(519) 885 1208
Married with four children	e-mail		rbsimpson@uwaterloo.ca

speaking and reading knowledge of French

EDUCATION

University	Course	Degree	Date Received
University of Toronto	Applied Math.	B.Sc.	1962
University of Toronto	Aero. Eng.	M.A.Sc.	1963
University of Maryland	Applied Math.	Ph.D.	1966

Awarded Bateman Research - Postdoctoral Fellowship:
 California Institute of Technology, 1966-68.

ACADEMIC EXPERIENCE

Rank/Position	Department	Institution/Firm	Dates
Postdoctoral Fellow	Mathematics	California Institute of Technology	1966-68
Assistant Professor	Mathematics	Rensselaer Polytechnic Institute	1968-71
Assistant Professor	Applied Analysis and Computer Science	University of Waterloo	1971-73
Associate Professor	Computer Science	University of Waterloo	1973-80
Professor	Computer Science and Applied Mathematics	University of Waterloo	1980-2005
Professor Emeritus	David Cheriton School of Computer Science	University of Waterloo	2005 - present
Associate Dean of Graduate Studies	Faculty of Mathematics	University of Waterloo	1981-83
Chairman	Computer Science	University of Waterloo	1984-87

MAJOR UNIVERSITY COMMITTEE EXPERIENCE

Departmental Graduate Committee	1972-76
Chairman & Graduate Officer	1973-76
University Senate Graduate Council	1975-77
Chairman, Faculty Computer Usage Committee	1979-81
Faculty Operations Research Committee	1979-80
Chairman, Faculty Graduate Committee	1981-83
Formative Committee, Information Technology Research Centre (Queen's/Toronto/Waterloo/Western)	1987
Director's Committee, Institute for Computer Research	1989-1990
Board of Directors, Institute for Computer Research	1994-1996
Operations Committee, Institute for Computer Research	1994-1996
University Senate Graduate Council	1996-1998
Promotion and Tenure Committee, Faculty of Arts	2000-2001
Promotion and Tenure Committee, Faculty of Engineering	2001-2003

RESEARCH EXPERIENCE

Investigator in NSF supported Numerical Analysis project.
Rensselaer Polytechnic Institute, 1969-71.

Participant in Summer Institutes supported by NATO
University of Calgary, 1968.
Battelle Institute ,Seattle, 1972.

Visiting Scientist, Reed Paper Ltd., Toronto, 1975.

Consultant, Environment Canada, NWRI, Burlington, Ontario, 1976-84.

Visiting Research Fellow, Institute of Computational Mathematics,
Brunel University, Uxbridge, U.K. 1978-79.

Consultant, Instituto Tecnologico Estudios Superiores de Monterrey
Monterrey, Mexico, 1987.

Visiting Scientist, Parallel Algorithms Group, CERFACS, Toulouse, France, 1991-92.

Visiting Scientist, INRIA, Rocquencourt, France, 1998.

Visiting Scientist, INRIA, Sophia-Antipolis, France, 1999.

PROFESSIONAL ACTIVITIES

Member,
    Association for Computing Machinery (ACM)
    Canadian Applied Mathematics Society (CAMS)
    Society for Industrial and Applied Mathematics (SIAM)
    Computational Fluid Dynamics Society of Canada

Editorial Board, SIAM Journal of Scientific and Statistical Computation, 1981-89.

Ontario Graduate Scholarship panel, 1982-1983, (chair 1983)

Canadian Commonwealth Scholarship Committee, 1985-87.

Council, Canadian Applied Mathematics Society, 1984-1986.

Consultant, Dean's Committee on Computer Science,
College of Engineering and Mathematics, University of Vermont, Burlington, Vermont, USA, 1989

Organizer, Symposium on Numerical Transport Modeling, Canadian Applied Mathematics Society, Ottawa, 1991.

Director, Scientific Computation Research Group, University of Waterloo, affiliated with the Institute for Computer Research, 1988-1998.

Reviewer, Computing Reviews, Mathematical Reviews.

Consultant, Graduate College, Kuwait University , 1993

Scientific Program Committee, Canadian Applied and Industrial Mathematics Society, Annual Meeting, Laval University, 1998

Appraisals Panel, Ontario Council of Graduate Studies, 1999 - 2002 (chair, 2001-2002)

Organizing Committee, Computational Fluid Dynamics Society of Canada, Annual Conference, University of Waterloo, 2001

Appraisal Panel chair, Postsecondary Education Assessment Board, Ontario Ministry of Colleges

and Universities, 2003

PUBLICATIONS

(a) **Papers in Refereed Journals**

1. "A Fundamental Solution for a Biharmonic Finite Difference Operator", Math. of Comp., Vol. 21 (1967), pp. 321-339.

2. "Approximation for the Minimizing Element for a Class of Functionals", SIAM J. Num. Anal., Vol. 5 (1968), pp. 26-41.

3. "The Rayleigh Ritz Process for the Simplest Problem in the Calculus of Variations", SIAM J. Num. Anal., Vol. 6 (1969), pp. 258-271.

4. "Positive Solutions of Nonlinear Elliptic Eigenvalue Problems", with D.S. Cohen, J. of Math. and Mech., Vol. 19, pp. 895-909.

5. "Finite Difference Methods for Mildly Nonlinear Eigenvalue Problems", SIAM J. of Num. Anal., Vol. 8 (1971), pp. 190-212.

6. "Existence and Error Estimates for Solutions of a Discrete Analog of Nonlinear Eigenvalue Problems", Math. of Comp., Vol. 26, (1972), pp. 359-377.

7. "Multiple Positive Solutions of Spherically Symmetric Nonlinear Boundary Value Problems", with F. Hacker, J. of M. Anal. and Applns., Vol. 43 (1973), pp. 357-372.

8. "A Method for the Numerical Determination of Bifurcation States of Nonlinear Systems of Equations", SIAM J. Num. Anal., Vol. 12 (1975), pp. 439-451.

9. "Local Versus Global Strategies for Adaptive Quadrature", with M.A. Malcolm, Trans. on Math. Software, Vol. 1 (1975), pp. 129-146.

10. "Centred Differencing and the Box Scheme for Diffusion- Convection Problems", with D.C.L. Lam, J. of Comp. Physics, Vol. 22, (1976), pp. 486-500.

11. "Numerical Solution of the Two-Dimensional Premixed Laminar Flame Equations", with S.L. Aly, C.E. Hermance, AIAA Journal, Vol. 17, (1979), pp. 56-63.

12. "Automatic Local Refinement for Irregular Rectangular Meshes", Int'l. J. of Num. Methods in Engr., Vol. 14, (1979), pp. 1665-1678.

13. "A Two-Dimensional Mesh Verification Algorithm", SIAM J for Scientific and Stat. Comp., Vol. 2, (1981), pp. 455-473.

14. "Triangular Meshes for Regions of Complicated Shape", with B. Joe, Int'l. J. of Num. Methods in Engr., Vol. 23, (1986), pp. 751-778.

15. "An Organization of the Extrapolation Method for Vector Processing", with A. Yacizi, Parallel Computing, Vol. 4, (1987), pp. 175-188.

16. "Corrections to Lee's Visibility Polygon Algorithm", with B. Joe, BIT, Vol. 27, (1987), pp. 458-473.

17. "On Optimal Interpolation Triangle Incidences", with E. F. D'Azevedo, SIAM J. for Scientific and Stat. Comp., Vol. 10, (1989), pp. 1063,1075.

18. "A Two Phase, Two Component Model for Natural Convection in a Porous Medium", with P. A. Forsyth, Int'l. J. of Num. Methods in Fluids, Vol. 12 , (1991) , pp. 655,682.

19. "On Optimal Triangular Meshes for Minimizing the Gradient Error", with E. F. D'Azevedo, Numerische Matematik, Vol. 59, (1991), pp. 321-348.

20. "Testing for Effects of Asymmetry and Instability on Preconditioned Iterations of Conjugate Gradient Type", IMA J for Num Anal, Vol. 14 , (1993), pp. 1-25.

21. "Anisotropic Mesh Transformations and Optimal Error Control", Applied Num Math, Vol. 14, (1994), pp 183-198.

22. "On Correctness and Efficiency for Advancing Front Techniques of Finite Element Mesh Generation", with S Farestam, BIT, Vol. 35, (1995), pp. 210-232.

23. "A Data Base Modeling Abstraction for Describing Triangular Mesh Algorithms", BIT , Vol. 37, (1997), pp.138-163.

24. "Planar Mesh Refinement Cannot Be Both Local and Regular", Numerische Matematik, Vol. 79, (1998), pp.1-10.

25. "Effects of Chemical Reactions on Iterative Methods for Implicit Time Stepping", with G J S Leeming and K U Mayer, Advances in Water Resources, Vol 22, (1998) pp. 333-347.

26. "Unstructured Meshing for Two Asset Barrier Computations", with D M Pooley, P A Forsyth, K R Vetzal, Applied Mathematical Finance, Vol 7 (2000) pp. 33-60

27. "Terminal-edges Delaunay (small-angle based) algorithm for the qualit y triangulation problem" with Maria-Cecilia Rivara and Nancy Hitschfeld, Computer-Aided Design, Vol 33 (2001) pp. 263-277.

28. "Approximate Shape Quality Mesh Generation" with Nancy Hitschfeld and Maria-Cecilia Rivara, Engineering with Computers, Vol 17 (2001), pp. 287-298

29. "Geometry Independence for a Meshing Engine for 2D Manifolds",Int'l J. of Num. Methods in Engr., Vol. 60, (2004), pp 675-694

30. "Interactive Venation Based Leaf Shape Modeling" with Sung Min Hong and Gladimir V. G. Baranoski, Computer Animation and Virtual Worlds, Vol 16:,(3-4), pages 415-427. 2005

31. "Computing Two-Factor Deltas Using Unstructured Meshes" with Amélie C. Bélanger, J. of Computational Finance, submitted Nov 2006.

(b) **Conference Proceedings, (refereed)**

1. "A Technique for Analysing Adaptive Quadrature Strategies", Proceedings Third Manitoba Conf. on Num. Math., University of Manitoba, pp. 369-378, 1973.

2. "Modelling Coastal Effluent Transport Using a Variable Finite Difference Grid", D.C.L. Lam, and R.B. Simpson. Advances in Computer Methods for Partial Differential Equations, II, Proc. IMACS Symposium, 1977, ed. R. Vichnevetsky.

3. "A Survey of Two Dimensional Mesh Generation", Proceedings of Ninth Manitoba Conference on Numerical Mathematics, 1980, University of Manitoba, pp. 49-124.

4. "Diffusion-Reaction Equations as a Test Set for Iterative Solvers", Proceedings, Copper Mountain Conference on Iterative Methods, April 1990.

5. " Aposteriori Error Estimation for Finite Volume Simulations of Fluid Flows', with B VanStraalen, G D Stubley, Canadian Computational Fluid Dynamics Conference, Banff, Alta, June 1995.

6. " Local Refinement for Anisotropic Mesh Generation", with P Varlagas, in "Trends in Unstructured Mesh Generation",AMD-Vol.220, The Applied Mechanics Division of the Amer Soc of Mech Eng., The Joint ASME/ASCE/SES Summer Meeting, Evanston, Illinois, USA, July 1997, pages 25-36

7. " Pricing Two Asset Barrier Options with Unstructured Meshes" with P A Forsyth and D M Pooley in Computational and Quantitative Finance Conference, New York, New York, USA, Sept, 1999.

8. "Isolating Geometry in Mesh Programming ", Proceedings: 8th Int'l Meshing Round Table, Oct. 1999, Sandia report Sand 99-2288 http://www.cfd.sandia.gov/8imr.html

9. "Approximate Quality Mesh Generation based on Small Edge Details", with N Hitschfeld and M-C Rivara, Proceedings: 9th Int'l Meshing Round Table, Oct. 2000, Sandia report Sand2000-2207 http://www.cfd.sandia.gov/9imr.html

10. "Geometrical Improvement Properties of Delaunay Terminal Edge Refinement", with M-C Rivara, Proceedings, 4th Int'l Conference on Geometric Modeling and Processing - GMP 2006, Pittsburgh, PA., USA, July 2006, Springer Lecture Notes in Computer Science, LNCS 4077.

11. "How Efficient is Adaptive Delaunay Refinement?", Proceedings: 15th Int'l Meshing Roundtable, Sept. 2006, Springer, ISBN-10 3-540-34957-X , http://www.imr.sandia.gov/

(c) **Conference Contributions, (unrefereed)**

1. "A Database Abstraction for Unstructured Triangular Mesh Algorithms" ICIAM '95, Hamburg, Germany, July 1995.

2. Contributed paper - Canadian Applied Mathematics Annual meeting, Toronto, M ay 30, 1997 " Effects of Chemical Quasi-Equilibria on Implicit Time Stepping Iterati ons " with G. J. S. Leeming, U. Mayer.

3. Contributed paper - Canadian Applied Mathematics Annual meeting, Laval, Quebec June, 1999 " Isolating Geometry in Mesh Programming "

4. Invited paper - The Canadian Society for the History and Philosphy of Mathematics, Annual meeting of the Learned Societies
University of Toronto, June 2002
" The Remarkable History of FORTRAN "

(d) **Books**

1. "Effluent Transport and Diffusion Models for the Coastal Zone", Lecture Notes on Coastal and Estuarine Studies, with D. C. L. Lam, and C. R. Murthy, Vol. 5, Springer-Verlag, 1984, (160 pages).

(e) **Reviews of Books**

1. Review of "Solving Elliptic Problems Using ELLPACK", by J. R. Rice, and R. F. Boisvert Springer-Verlag Computing Reviews, 1987.

2. Review of "Engineering Applications Software Development using FORTRAN 77", by Gregory A. Moses, Wiley-Interscience Computing Reviews, CR 9001-0012, 1990.

(f) **Chapters in Books**

1. "Groundwater Flow as a Singular Perturbation Problem and Remarks about Numerical Methods", in 'Nonlinear Problems in Physical Sciences and Biology', Lecture Notes in Mathematics No. 322, pp. 288-297, Springer Verlag, 1973.

(g) **Reports**

1. "Pressure Measurements in Low Energy Underwater Explosions", Master's thesis, UTIAS Tech. Note, No. 72, 1963.

2. "The Periods of the Longitudinal Surface Seiche of Lake Ontario", with D.V. Anderson, Proc. Great Lakes Rer. Conf., Pub. 11, the University of Michigan, 1964.

3. "The Surface Tides of Lake Ontario", with D.V. Anderson, Ontario Department of Lands and Forests, Report 76, 1966.

4. "A Demonstration of Modelling Effluent Transport: A Simple Plume", Environment Canada, unpublished report, 1978.

5. "An Organization of the Extrapolation Method of Multi- dimensional Quadrature for Vector Processing", with A. Yazici, Department of Computer Science Research Report CS-78-39.

6. "Software Support for Models of Effluent Transport in the Near Shore Zone of Lakes", with J. A. George, Waterloo Research Institute Report, Report No. 606-03-03, March 1979.

7. "Implementations using External Storage for the Crank Nicholson and Extrapolated Backward Euler Methods for Finite Element Programs", with David C. L. Lam, Department of Computer Science Report CS-31-07.

8. "On Consistent Equiarea Triangulations", University of Waterloo, Department of Computer Science Report CS-87-60. Oct. 87.

9. "A Two Phase, Two Component Model for Natural Convection in a Porous Medium", with P. A. Forsyth, University of Waterloo, Department of Computer Science Research Report CS-89-55.

10. "On Optimal Triangular Meshes for Minimizing the Gradient Error" with E F D'Azevedo, University of Waterloo, Department of Computer Science Research Report CS-91-10.

11. "Testing for Effects of Asymmetry and Instability on Preconditioned Iterations of Conjugate Gradient Type", University of Waterloo, Department of Computer Science Research Report CS-91-22.

12. "A Data Base Abstraction for Unstructured Triangular Mesh Algorithms" CERFACS technical report TR/PA/92/66, January, 1992.

13. "On Correctness and Efficiency for Advancing Front Techniques of Finite Element Mesh Generation" ,with S Farestam, University of Waterloo, Department of Computer Science Research Report CS-93-38, July 1993.

14. " An Illustration Technique for Unstructured 3-D Meshes" , with N P Konrad, University of Waterloo, Department of Computer Science Research Report CS-93-30, November 1993.

15. " Planar Mesh Refinement Cannot be Both Local and Regular" with J F Buss, University of Waterloo, Department of Computer Science Research Report CS-97-4, November 1997.

16. "C++ classes for 2-D Unstructure Mesh Programming", INRIA-Rocquencourt research report 3592, January, 1999.

17. " Geometrical Mesh Improvement Properties of Delaunay Terminal Edge Refinement" with M-C Rivara, David Cheriton School of Computer Science Technical Report CS-2006-16, July 25, 2006

RESEARCH FUNDING (since 1988)

Period	Type	Source	Amount
1988-1990	Research Grant, individual	NSERC Operating	$14,000
1988-1989	Research Grant, group of 4 with P A Forsyth, W L Seward, W P Tang	ITRC	$120,000
1989-1992	Research Grant, group of approx. 70 Principal Investigator I Munro	NSERC Infrastructure	$400,000
1990-1991	Research Grant, group of 4 with P A Forsyth, W L Seward, W P Tang	ITRC	$150,000
1991-1993	individual	NSERC Operating	$17,000
1992	Research Grant, group of 4 with P A Forsyth, W L Seward, W P Tang	ITRC	$65,000
1992-1995	Research Grant, group of approx. 70 Principal Investigator I Blake	NSERC Infrastructure	$352,000
1993-1994	Research Grant, group of 4 with P A Forsyth, H Jiang, W P Tang	ITRC	$113,000
1994-1998	Research Grant, individual	NSERC	$18,000
1994-1996	Contract, group of 2 Principal Investigator G Stubley	Advanced Scientific Computing Ltd, Waterloo	$20,000
1995-1998	Research Grant, group of 4 with P A Forsyth, J A George, W P Tang	ITRC	$75,000
1998 - 2003	Research Grant, individual	NSERC	$24,225
1998-2000	Research Grant, group of 6 with P A Forsyth, J A George, W P Tang P Boyle , K Vetzal	CITO	$50,000
2001	Instructional Grant	U of Waterloo, MEF	$2,500
2004 - 2008	Research Grant, individual	NSERC	$27,000

GRADUATE STUDENT SUPERVISION

Ph.D. Students

   Margaret K. Brown, 1971
   David C.L. Lam, 1974
   Ali Yazici, 1983
   Barry Joe, 1984
   Edward F. D'Azevedo, 1989
   Stefan Farestam, (co-supervised, CERFACS, U of Toulouse), 1993

Masters Students

F. Hacker, 1970	S. T. Tan, 1972
D. Clysdale, 1973	C. L. Lam, 1973
D. W. B. Prentice, 1973	R. Cormier, 1973
L. M. L. Lee, 1974	T. Granofsky, 1974
H. M. Choy, 1975	O. S. Anizor, 1975

M. O. Afolabi, 1976	R. C. Gupta, 1976
J-M. Ning, 1976	E. Manding, 1976
B. Zoltak, 1976	D. Dunbar, 1977
S-Y. Fan, 1977	D. Yavari-Issalou
T. S-Y. Kot, 1978	P. Po, 1978
G. Owaso, 1980	C. Chow, 1980
D. Donnan, 1980	R. P. Srivastava, 1982
R.M. Corless, 1982	J. W. Roberts, 1984
D.M. Woit, 1989	
G.F. Walter, 1991	E.F. Dzik, 1991
N. Konrad, 1994	D.M.K. Ip 1993
X. Niu, 1994	B. Vanstraalen 1995
P. Varlagas 1996	T. Van Nyugen 1997
C. K. J. Tang 1997	G. J. S. Leaming 1997
D. M. Pooley (joint with PAF) 1999	D Mohaplova (2002)
A. C. Belanger (2002)	S. Huen (2003)
S. M. Hong (2005)	R Li (current)

POST DOCTORAL STUDENT SUPERVISION

Dr Ronald Haynes   NSERC Post Doctoral Fellowship (2003-2004)
                      Phd: Department of Applied and Computational Mathematics,
                      Simon Fraser University