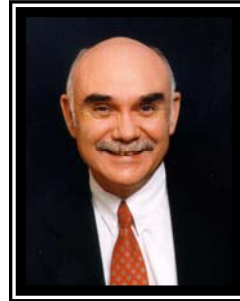


CURRICULUM VITAE

**GRAHAM CLIFFORD GOODWIN**

BSc, BE, PhD, Tekn dr h.c.  
FIEEE, Hon.FIE Aust., FTSE, FAA, FRS



PERSONAL DATA

QUALIFICATIONS

POSITIONS HELD

JOURNAL ASSOCIATE EDITORSHIP

FELLOWSHIPS OF ACADEMIC AND PROFESSIONAL  
ORGANIZATIONS

PRIZES AND AWARDS

SUPERVISION

PUBLICATIONS

Books

Chapters in Books

Special Papers

Patents

Journal Papers

Plenary and Keynote Addresses

Refereed Conference Papers

Technical Reports to Industry (Confidential)

**PERSONAL DATA**

WORK ADDRESS: School of Electrical Engineering and Computer Science,  
The University of Newcastle,  
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Callaghan, New South Wales, 2308, Australia  
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<http://www.ee.newcastle.edu.au/users/staff/eeecg/Goodwin.html>

DATE & PLACE OF BIRTH: 20 April, 1945  
Broken Hill, NSW, Australia

FAMILY: Married - 2 Children

**QUALIFICATIONS**

University of New South Wales, Australia

1964 Bachelor of Science, majoring in Physics.

1966 Bachelor of Electrical Engineering, First-Class Honours and University Medal.

1970 Doctor of Philosophy, Electrical Engineering  
Topic: "Iterative Methods and Optimal Input Signals for Nonlinear System Identification".

2003 Honorary Doctor, Lund Institute of Technology, Sweden.

**POSITIONS HELD**

Oct. 1971 - May 1974 Lecturer, Department of Computing and Control, Imperial College, London.

May 1974 - Dec. 1975 Lecturer, Department of Electrical Engineering, The University of Newcastle, NSW, Australia

Jan. 1976 - Dec. 1976 Senior Lecturer, Department of Electrical Engineering The University of Newcastle, NSW, Australia.

Jan 1977 - Aug. 1983 Associate Professor, Department of Electrical Engineering, University of Newcastle, NSW, Australia.

Jan. 1979 - Dec. 1984 Head of Department, Electrical and Computer Engineering, University of Newcastle, NSW, Australia.

Aug. 1983 - Present Professor of Electrical Engineering in the Department of Electrical and Computer Engineering, The University of Newcastle, NSW, Australia.

Jan. 1988 - Dec. 1996 Director, Centre for Industrial Control Science (*Commonwealth Government Funded Special Research Centre*).

Jan. 1994 - Dec. 1996 Dean, Faculty of Engineering, The University of Newcastle, NSW, Australia.

Jan. 1997 - 2001 Director, Centre for Integrated Dynamics and Control (*Commonwealth Government Funded Special Research Centre*).

2001 Distinguished Lecturer, IEEE Control Systems Society.

Jan 2002 – Present	<u>Research Director</u> , Centre for Complex Dynamic Systems and Control ( <i>Commonwealth Government Funded Research Centre</i> ).
Jan 2002 – Present	<u>ARC Federation Fellow</u> .
May 2003 – Present	<u>Board Member</u> , NICTA (National Information and Communications Technology Australia)

### **DISTINGUISHED APPOINTMENTS**

Appointed in 1998	<u>Honorary Professor</u> , Northeastern University, China.
Appointed in 2004	<u>Distinguished Professor</u> , Universidad Technica Federico Santa Maria, Chile.

### **OTHER POSITIONS**

Jan. 1982 - July 1982	<u>Visiting Professor</u> , University of Houston, Texas, U.S.A.
June 1984	<u>Visiting Professor</u> , University of Witwatersrand, South Africa.
Sept. 1985 - Jan. 1985	<u>Visiting (SERC) Research Fellow</u> , Imperial College, London, U.K.
Jan. 1985 - Dec. 1986	<u>Member of the Australian Research Grants Committee</u> , (concerned with the award of government research grants in the area of Engineering).
November 1986	<u>Louis Klein Visiting Professorship</u> , Israel Institute of Technology, Israel.
Jan. 1991 - Dec. 1992	<u>Member of the Research Training and Careers Committee</u> of the Australian Research Council (concerned with the award of research fellowships).
1990 - 1993	<u>Joint Program Chairman</u> , 12th Triennial World Congress of the International Federation of Automatic Control.
December 1995 - Present	<u>Consultant</u> , General Motors Research Laboratories, USA.
January 1997 - 1999	<u>Foundation Chairman</u> , CICS Automation Pty Ltd.
January 2000 - 2002	<u>Chair</u> , IEEE (USA) Control Systems Society Fellow Evaluation Committee.

### **Journal Associate Editorship**

Journal Australian Mathematical Society, (1980-1981).  
 IEEE Transactions on Automatic Control (USA), (1982-1983).  
 Automatica, (1983-1988).  
 Journal Optimal Control - Applications and Methods, (1983-1990).  
 International Journal of Adaptive Control and Signal Processing, (1987-present).  
 Mathematics of Control, Signals and Systems, (1987-1988).  
 System and Control Letters, (1988-1993, 1995-present).  
 Asian Journal of Control (1990-present)  
 Journal of Systems & Control Engineering (1990-present)

### **Fellowships of Academic and Professional Organizations**

Honorary Fellow of the Institution of Engineers Australia  
 Fellow of the Institute of Electrical and Electronics Engineers (USA).  
 Member, International Statistical Institute.  
 Fellow of the Australian Academy of Technological Sciences and Engineering.  
 Fellow of the Australian Academy of Science.

Fellow of the Royal Society, London.

Foreign Member of the Royal Swedish Academy of Sciences.

### **Prizes and Awards**

University Medal (1966) Electrical Engineering, University of New South Wales.

Institute of Engineers, Australia - 1970 J.R. Bainton Prize for best published paper.

1979 Edgeworth David Medal from the Royal Society of N.S.W.

Institute of Electrical and Electronics Engineers Inc. (IEEE) Control Systems Society Outstanding Paper Award for best paper published in *the IEEE Transactions on Automatic Control*, 1980.

1987 International Federation of Automatic Control Prize for Best Control Engineering Text Book - "Adaptive Filtering Prediction and Control" by G.C. Goodwin & K.S. Sin, Prentice Hall, 1984.

1991 MA Sargent Medal from The Institution of Engineers, Australia, for Outstanding Electrical Engineer in Australia (Annual prize to one candidate).

1999 Hendrik W. Bode Lecture Prize, from the IEEE Control Systems Society, USA. (This prize is the highest award given by IEEE Control System Society – USA).

Paper selected as one of the 25 papers published in the 20<sup>th</sup> Century which have had a major impact on the field of Control – IEEE Control Systems Society.

2002 Best Paper Award, Asian Journal of Control.

Named on the ISI Highly Cited list as one of the top 100 most cited engineers in the world.

### **SUMMARY OF PUBLICATIONS**

8	Books
3	Edited books
22	Chapters in Books
161	International Journal Papers
37	Plenary Addresses
220	Refereed Conference Papers
108	Technical Reports to Industry
5	Patents

Goodwin's publications have received between 100 and 150 citations per year over the past 10 years.

### **SUPERVISION**

Successfully supervised 30 Ph.D. students and 10 Masters Students. Former students hold senior positions in industry and at Universities in Australia, Hong Kong, Chile, Argentina and Singapore.

## PUBLICATIONS

### GRAHAM C. GOODWIN

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#### **BOOKS**

##### Books - Monographs

- [1] C.B. Speedy, R.F. Brown and G.C. Goodwin, Control Theory, Oliver and Boyd Ltd., 1970. (Also published in Russian).
- [2] G.C. Goodwin and R.L. Payne, Dynamic System Identification: Experiment Design and Data Analysis, Academic Press, 1977. (Also published in Chinese).
- [3] G.C. Goodwin and K.S. Sin, Adaptive Filtering, Prediction and Control, Prentice Hall 1984. (Also published in Chinese).
- [4] R.H. Middleton and G.C. Goodwin, Digital Estimation and Control: A Unified Approach, Prentice Hall 1990.
- [5] A. Feuer and G.C. Goodwin, Sampling in Digital Signal Processing and Control, Birkhauser 1996.
- [6] M.M. Seron, J. Braslavsky and G.C. Goodwin, Fundamental Limitations in Filtering and Control, Springer Verlag 1996.
- [7] G.C. Goodwin, S. Graebe and M. Salgado, Control System Design, Prentice Hall, 2000.
- [8] G.C. Goodwin, M.M. Seron and J.A. De Doná, Constrained Control and Estimation, Springer Verlag 2004.

##### Books - Edited

- [9] G.C. Goodwin (Editor), Robust Adaptive Control, proceedings of the IFAC Workshop, Newcastle, Australia, August 1988, Pergamon Press 1989.
- [10] G.C. Goodwin and R.J. Evans (Editors), Proceedings - IFAC World Congress, (10 volumes) Australia, July 1994.
- [11] K.J. Åström, G.C. Goodwin and P.R. Kumar, Adaptive Control Filtering and Signal Processing, Springer Verlag 1994.

##### Books - In Preparation

- [12] D. Quevedo and G.C. Goodwin, Theory and Application of Finite Set Optimization, in preparation.
- [13] A. Bastiani, G.C. Goodwin and F. Sobora, A Virtual Laboratory for Control System Design, in preparation.
- [14] J.C. Aguero, G.C. Goodwin, J. Welsh and J. Yuz, System Modelling and Identification, in preparation.

#### **CHAPTERS IN BOOKS**

- [1] G.C. Goodwin and R.L. Payne, "Choice of sampling intervals". Chapter in System Identification: Advanced and Case Studies, edited by Lainiotis and Mehra, Academic Press, 1976.

- [2] G.C. Goodwin and R.H. Middleton, "Adaptive control of continuous and discrete time systems". Chapter in Vol. XXXIV of Advances in Control and Dynamic Systems, edited by C.T. Leondes, Academic Press, 1985.
- [3] G.C. Goodwin, "Martingales and semi-martingales". Chapter in Encyclopaedia of Systems and Control, Pergamon Press Ltd., 1985.
- [4] G.C. Goodwin, "Stability of stochastic adaptive systems using martingale theory". Chapter in Encyclopaedia of Systems and Control, Pergamon Press, 1985. *Also*, Chapter in Concise Encyclopaedia of Modelling & Simulation, editors in D.P. Atherton & P. Borne, Pergamon Press, 1991.
- [5] G.C. Goodwin, "Experimental design for system identification", Chapter in Encyclopaedia of Systems and Control, Pergamon Press Ltd., 1985.
- [6] G.C. Goodwin, R.H. Middleton and M.E. Salgado, "A unified approach to adaptive control". Chapter 6 in Implementation of Self Tuning Controllers, edited by K. Warwick, Peter Peregrinus Ltd., U.K., 1988, pp.126—139.
- [7] G.C. Goodwin, B.A. León de la Barra and R.J. Mazzaferri, "Some preliminary results on connecting identification and robust control". Chapter in Control of Uncertain Systems, edited by D. Hinrichsen and B. Martensson, Birkhauser, 1990.
- [8] J.M. Fernandez, C.E. de Souza and G.C. Goodwin, "An application of adaptive scheme to fluid level control". Chapter in Advances in Adaptive Control, edited by K.S. Narendra, R. Ortega, P. Dorato, IEEE Press, 1991.
- [9] G.C. Goodwin and M.E. Salgado, "Unified continuous and discrete time LQG theory". Chapter in Mathematical System Theory: The Influence of R.E. Kalman, edited by T. Antoulas, Springer Verlag, 1991.
- [10] B. Ninness and G.C. Goodwin, "The relationship between discrete time and continuous time linear estimation". Chapter in Identification of Continuous Time Systems, edited by N.K. Sinha, Kluwer Publishers, 1991.
- [11] G.C. Goodwin, M. Gevers, D.Q. Mayne and V. Wertz, "Stochastic adaptive control: Results and perspective". Chapter in Statistical Theory of Identification and Adaptive Control, edited by P.E. Caines and L. Gerencen, Springer Verlag, 1991.
- [12] D.J. Hill, C. Wen and G.C. Goodwin, "Stability analysis of decentralized robust adaptive control". Chapter in Advances in Adaptive Control, edited by P. Dorato, IEEE Press, New York, 1991.
- [13] R.H. Middleton and G.C. Goodwin, "Adaptive computed torque control for rigid link manipulators". Chapter in Robot Control: Dynamics, Motion Planning and Analysis, edited by F.L. Lewis and C.T. Abdallah, IEEE Press, 1992.
- [14] B.M. Ninness and G.C. Goodwin, "Estimation for robust control". Chapter in Robust Identification and Control, edited by R. Smith, Springer Verlag, 1994.
- [15] A Feuer and G.C. Goodwin, "Sampled data systems". Chapter in The Control Handbook, CRC Press 1995.
- [16] S.R. Weller, H.V. Poor and G.C. Goodwin, "Lattice filters in discrete and continuous time". Chapter in book, Digital Signal Processing (Techniques and Their Applications). Theme volume in C.T. Leondes' Control and Dynamic Systems series, 1994.
- [17] G.C. Goodwin, M.E. Romero and M.M. Seron, "Robust Model Predictive Control via Sensitivity Augmentation", Chapter in book, The Åström Symposium on Control, Wittenmark and Rantzer Eds, Studentlitterator, Sweden, 1999.
- [18] G.C. Goodwin and J.S. Welsh, "Singularity issues associated with closed loop Identification", Chapter in Model Identification and Adaptive Control: From Windsurfing to Telecommunications, Springer-Verlag, December 2000.

- [19] G.C. Goodwin and O. Rojas, "Robust Issues Associated with the Provision of Integral Action in Nonlinear Systems", Chapter in Perspective in Robust Control, Ed. S.O. Reza Moheimani, Springer Verlag, London 2001.
- [20] G.C. Goodwin, T. Perez and J.A. De Doná, "An introduction to constrained control", Chapter in Modelling Control and Optimization of Complex Systems, Kluwer Academic Press, 2003.
- [21] G.C. Goodwin and A. Feuer, "Control", Chapter in Encyclopedic Reference of Neuroscience, Ed. U. Windhorst, M. Binder and N. Hirokawa, Springer, to appear.
- [22] G.C. Goodwin and A. Feuer, "Adaptive Control", Chapter in Encyclopedic Reference of Neuroscience, Ed. U. Windhorst, M. Binder and N. Hirokawa, Springer, to appear.

## SPECIAL PAPERS

- [1] G.C. Goodwin, P. Ramadge and P.E. Caines, "Discrete time multivariable adaptive control", chosen to appear in Twenty Five Seminal Papers in Control, IEEE Press, 2000. (This article was selected as one of 25 papers published in the Twentieth Century which have made a major impact on the field of control.)

## PATENTS

- [1] E.K. Teoh, G.C. Goodwin and W.J. Edwards, "Rolling Mill Strip Thickness Controller", Aust. Patent No. PG1318/83, 1983; US Patent No. 4691547, 1987.
- [2] Goodwin and S. Crisafulli, "Method and Apparatus for Automated Tuning of PID Controllers", Aust. Patent No. PO2419, 1996; US Patent No. 09/147,937, 1999.
- [3] G. O'Keefe, J. Lee, R. Turner, G. Adams, G.C. Goodwin, "Improvements to Gravity Gradiometers", Patent No. 5922951, 1997
- [4] G. O'Keefe, J. Lee, R. Turner, G. Adams, G.C. Goodwin. "Gravity Gradiometers Accelerometers". US Patent No. 5962782, 1997.
- [5] W.J. Edwards, M. Fu, G.C. Goodwin, and G. Wallace, "Strip Velocity Measurement in Rolling Mills", Patent No. PQ4531, 1999.

## JOURNAL PAPERS

- [1] R.F. Brown and G.C. Goodwin, "Simplified Method of Eliminating the Effect of Nonlinearities on Process Crosscorrelations", *Electronics Letters*, Vol.2, No.12, December 1966.
- [2] R.F. Brown and G.C. Goodwin, "New class of pseudo random binary sequences", *Electronics Letters*, Vol.3, No.5, May 1967.
- [3] R.F. Brown and G.C. Goodwin, "Hybrid method of state and parameter estimation for use in gradient techniques", *Electronics Letters*, Vol.3 No.12, December 1967.
- [4] G.C. Goodwin, "Estimation of process parameters and states", *Trans. of I.E. Aust.*, Vol.EE5, No.1, March 1969.
- [5] G.C. Goodwin and R.D. Bell, "Error- free identification using maximally orthogonal P.R.B.N. sequences", *Electronics Letters*, Vol.5, No.19, September 1969.

- [6] G.C. Goodwin, "Input synthesis for minimum covariance state and parameter estimation", *Electronics Letters*, Vol.5, No.21, October 1969.
- [7] G.C. Goodwin, "A simplified method for the determination of the curvature of an error index with respect to parameters and initial states", *Int. Journal of Control*, Vol.8, June 1969, pp.253-254.
- [8] G.C. Goodwin, "Application of curvature methods to parameter and state estimation", *Proc. IEE*, Vol.116, No.6, June 1969, pp.1107-1110.
- [9] R.D. Bell, G.C. Goodwin and J. Sieuwerts, "The determination of a continuous model of a steam generator using Pseudo Random Binary noise", *E.E. Trans. I.E. Aust.*, September 1970, pp.65-68.
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- [12] R.F. Brown and G.C. Goodwin, "Efficient calculation of curvature in state and parameter estimation", *Electronics Letters*, Vol.6, No.18, September 1970.
- [13] G.C. Goodwin, "Optimal input signals for nonlinear system identification", *Proc. IEE*, Vol.118, No.7, July 1971, pp.922-926.
- [14] G.C. Goodwin, "An amplitude constrained minimum variance controller", *Electronic Letters*, Vol.8, No.7, April 1972.
- [15] G.C. Goodwin, J.C. Murdoch and R.L. Payne, "Optimal test signal design for linear S.I.S.O. System Identification", *Int. Journal of Control*, Vol.17, No1, 1973, pp.45-55.
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- [17] R.L. Payne and G.C. Goodwin, "On the identifiability of linear dynamic systems", *Int. Journal of Control*, Vol.20, No.5, 1974, pp.865-868.
- [18] M.B. Zarrop and G.C. Goodwin, "Comments on optimal inputs for system identification", *IEEE Trans. on Auto. Control*, Vol.AC-20, No.2, February 1975, pp.299-300.
- [19] R.L. Payne, G.C. Goodwin and M.B. Zarrop, "Frequency domain approach for designing sampling rates for system identification", *Automatica*, Vol.11, No.2, March 1975, pp.189-191.
- [20] T.S. Ng and G.C. Goodwin, "On optimal choice of sampling strategies for linear system identification", *Int. Journal of Control*, Vol.23, June 1976, pp.459-475.
- [21] G.C. Goodwin and P.V. Kabaila, "Comments on parameter estimation in multivariate stochastic difference equations", *IEEE Trans. on Auto. Control*, Vol.AC-20, No.5, October 1975, pp.719-720.
- [22] G.C. Goodwin, P.V. Kabaila and T.S. Ng, "On the optimization of vector valued performance criteria", *IEEE Trans. on Auto. Control*, Vol.AC-20, No.6, 1976, pp.803-804.
- [23] T.S. Ng, G.C. Goodwin and B.D.O. Anderson, "Identifiability of MIMO linear dynamic systems operating in closed loop", *Automatica*, Vol.13, 1977, pp.477-485.
- [24] T.S. Ng, G.C. Goodwin and R.L. Payne, "On maximal accuracy estimation with output power constraints", *IEEE Trans. on Auto. Control*, Vol.AC-22, No.1, February 1977, pp.133-134.
- [25] T.S. Ng, G.C. Goodwin and T. Söderstrom, "Optimal experiment design for linear system with input/output constraints", *Automatica*, Vol.13, 1977, pp.571-577.

- [26] P.V. Kabaila and G.C. Goodwin, "On the estimation of the parameters of an optimal interpolator when the class or interpolators is restricted", *SIAM Journal on Control and Optimization*, March 1979.
- [27] P.J. Ramadge and G.C. Goodwin, "Design of restricted complexity adaptive control systems", *IEEE Trans. on Auto. Control*, Vol.24, No.4, August 1979, pp.584-588.
- [28] M.B. Zarrop, R.L. Payne and G.C. Goodwin, "Experiment design for time series analysis - The Multivariate Case", *SIAM J. on Appl. Mathematics*, Vol.37, No.2, October 1979.
- [29] G.C. Goodwin, H.B. Doan and A. Cantoni, "Application of ARMA models to automatic channel equalization", *Information Sciences*, Vol.22, 1980, pp.107-129.
- [30] Z.H. Qureshi, T.S. Ng and G.C. Goodwin, "Optimum experiment design for identification of distributed parameter systems", *Int. Journal of Control*, Vol.31, No.1, 1980, pp.21-29.
- [31] G.C. Goodwin and R.S. Long, "Generalization of results on multivariable adaptive control", *IEEE Trans. on Auto. Control*, Vol.AC-25, No.6, December 1980, pp.1241-1245.
- [32] G.C. Goodwin, P.J. Ramadge and P.E. Caines, "Discrete time multivariable adaptive control", *IEEE Trans. on Auto. Control*, Vol.AC-25, No.3, June 1980, pp.449-456.
- [33] K.S. Sin and G.C. Goodwin, "Checkable conditions for identifiability of linear systems operating in closed loop", *IEEE Trans. on Auto. Control*, Vol.AC-25, No.5, August 1980, pp.722-729.
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- [37] G.C. Goodwin and K.S. Sin, "Adaptive control of non-minimum phase systems" *IEEE Trans. on Auto. Control*, Vol.AC-26, No.2, April 1981, pp.478-483.
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- [40] G.C. Goodwin and A. Cantoni, "Computer Engineering: An innovation in education at the University of Newcastle". *The Australian Computer Bulletin*, September 1980, pp.4-5.
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