

CURRICULUM VITAE

Peter Stephen DONELAN

Qualifications

BSc (Hons) in Mathematics, Bristol, 1976; PhD, Southampton, 1984

Employment

2019–	Associate Professor
2013–18	Head of School of Mathematics and Statistics
2001–04	Head of School of Mathematics, Statistics and Computer Science
1992–2018	Senior Lecturer in Mathematics, VUW
1982–91	Lecturer in Mathematics, VUW (0.5 FTE to 1989)
1981	Assistant Research Officer, Department of Health, Wellington
1978–84	PhD (EPSRC grant), Southampton University, UK
1977	Editorial Assistant, Institute of Physics, Bristol, UK

Research Interests

Mathematics and geometry of robotics, including applications of Lie groups and Lie algebras, singularity theory, algebraic geometry and invariant theory; mathematics and poetry.

Chapters in Books

1. S. Amirinezhad, **P. Donelan** and A. Müller, Transversality and its applications in kinematics, in *Advances in Robot Kinematics, Bologna, Italy 2018* eds J. Lenarčič and V. Parenti-Castelli, Springer, (2018) 221–229
2. S. Amirinezhad and **P. Donelan**, Kinematic constraint maps and C-space singularities for planar mechanisms with prismatic joints, in *Advances in Robot Kinematics, Bologna, Italy 2018* eds J. Lenarčič and V. Parenti-Castelli, Springer, (2018) 212–220
3. S. Amirinezhad and **P. Donelan**, Kinematic singularities of a 3-dof planar geared robot manipulator, in *Advances in Robot Kinematics, Grasse, France, 2016*, eds J. Lenarčič and J.-P. Merlet, Springer, (2018) 441–449
4. **P. Donelan** and A. Müller, Towards a unified notion of kinematic singularities for robot arms and non-holonomic platforms, in *Advances in Robot Kinematics, Grasse, France, 2016*, eds J. Lenarčič and J.-P. Merlet, Springer, (2018) 393–401
5. M. Daher and **P. Donelan**, Invariant properties of the Denavit–Hartenberg parameters, in *Interdisciplinary Applications of Kinematics, Mechanisms and Machine Science Vol. 26*, eds A. Kecskemethy and F. Geu Flores, Springer (2015) 43–51

6. **P. Donelan** and A. Müller, Singularities of regional manipulators revisited, in *Advances in Robot Kinematics, Portoroz, 2010*, eds J. Lenarčič and M. Stanišič, Springer, Dordrecht (2010) 509–519
7. **P. S. Donelan**, Kinematic singularities of robot manipulators, in *Advances in Robot Manipulators*, ed A. Lazinica, In-Tech, Vienna, Austria (2010) 401–416
8. **P. Donelan**, Genericity conditions for serial manipulators, in *Advances in Robot Kinematics, Batz-sur-Mer, 2008*, eds J. Lenarčič and P. Wenger, Springer, Dordrecht (2008) 185–192
9. J. M. Selig and **P. Donelan**, A screw syzygy with application to robot singularity computation, in *Advances in Robot Kinematics, Batz-sur-Mer, 2008*, eds J. Lenarčič and P. Wenger, Springer, Dordrecht (2008) 147–154
10. **P. S. Donelan**, Singularities of robot manipulators, in *Singularity Theory, Proc. 2005 Marseille Singularity School and Conference*, eds D. Chéniot *et al*, World Scientific, Singapore (2007) 189–218
11. J.-P. Merlet and **P. Donelan**, On the regularity of the inverse Jacobian of parallel robots, in *Advances in Robot Kinematics, Ljubljana, 2006*, eds J. Lenarčič and B. Roth, Springer, Dordrecht (2006) 41–48

Refereed Journal Publications

12. **P. Donelan** and J. M. Selig, Hyperbolic pseudoinverses for kinematics in the Euclidean group, *SIAM J. Matrix Analysis and Applications*, **37** (2017) 1541–1559
13. L. Kempthorne and **P. Donelan**, Barbilian–Barbu—a case study in mathematico-poetic translation, *Signata—Annals of Semiotics*, **7** (2016) 337–360
14. M. Daher and **P. Donelan**, Invariants of the k -fold adjoint action of the Euclidean isometry group, *J. Geometry*, **107** (2015) 169–185
15. **P. S. Donelan**, Singularity-theoretic methods in robot kinematics, *Robotica*, **25** (2007) 641–659
16. **P. S. Donelan**, C. G. Gibson and W. Hawes, Trajectory singularities of general planar motions, *Proc. Royal Soc. Edinburgh*, **129A** (1999) 37–55
17. **P. S. Donelan** and C. P. Scott, Real inflections of four-bar coupler curves, *Mechanism and Machine Theory*, **30** (1995) 1179–1191
18. **P. S. Donelan** and C. G. Gibson, On the hierarchy of screw systems, *Acta Applicandae Mathematicae*, **32** (1993) 267–296
19. **P. S. Donelan**, On the geometry of planar motions *Quarterly J. Math. Oxford*, **44** (1993) 165–184

20. **P. S. Donelan** and C. G. Gibson, First-order invariants of Euclidean motions, *Acta Applicandae Mathematicae*, **24** (1991) 233–251
21. **P. S. Donelan**, Generic properties in Euclidean kinematics, *Acta Applicandae Mathematicae*, **12** (1988) 265–286

Refereed Conference Papers

22. S. Amirinezhad and **P. Donelan**, Input and output singularities for parallel manipulators, in *Proc. IFToMM World Congress*, Springer (2019) (10pp), *to appear*
23. S. Amirinezhad and **P. Donelan**, Kinematic constraint maps, \mathcal{C} -space singularities and generalised Grashof conditions, in *Proc. ASME 2017 IDETC/CIE Conf.*, ASME (2017) V05BT08A071 (10pp)
24. **P. Donelan** and A. Müller, General formulation of the singularity locus for a 3-dof regional manipulator, in *Proc. Int. Conf. Robotics and Automation, Shanghai, 2011*, IEEE, Piscataway NJ, (2011) 3958–3963
25. M. Cocke, **P. S. Donelan** and C. G. Gibson, Trajectory singularities for a class of parallel motions, in *Real and Complex Singularities, São Carlos Workshop, Marseille, 2004*, eds J.-P. Brasselet and M. A. Soares Ruas, Birkhäuser (2006) 53–70
26. M. Cocke, **P. S. Donelan** and C. G. Gibson, Instantaneous singular sets associated to spatial motions, in *Real and Complex Singularities, São Carlos Workshop, 1998*, eds F. Tari and J. W. Bruce, Res. Notes Math., **412** Chapman and Hall/CRC, Boca Raton, (2000) 147–163
27. **P. S. Donelan** and C. G. Gibson, Singular phenomena in kinematics, in *Singularity Theory, Proc. European Singularities Conf., Liverpool, 1996*, London Math. Soc. Lecture Notes **263**, Cambridge UP (1999) 379–402

Other research outputs

- (with J. Azzato) Singularities in Robot Kinematics—A Publications Database (2007), <http://ecs.vuw.ac.nz/~donelan/cgi-bin/rsmain>
- (with A. Heyes, S. Shep and M. Sonzogni) A Timeline of Mathematics and Poetry (2017), <http://mathematicalpoets.weebly.com/>

Un-refereed conference papers and seminars (2010–)

1. Hyperbolic generalised inverses, optimality and hybrid control, NZ Mathematics Colloquium, Otago University, December 2018

2. Dan Barbilian/Ion Barbu: Mathematician and Poet, NZ Mathematics Colloquium, Canterbury University, December 2015
3. Looking both ways: mathematics transition between school and university, NZAMT 13 Conference, Wellington, July 2013
4. A Genericity Theorem for Singularities, Bruce 60 Wall 75: International Workshop in Singularity Theory, its Applications and Future Prospects, Liverpool, UK, June 2012
5. Singularities and Robotics: Lie Groups and Products of Exponentials, 2nd International Workshop on Singularities in Geometry and Applications, IMPAN Research Centre, Bedlewo, Poland, May 2011
6. Geometric Jacobians and singularity loci of regional manipulators, NZ Mathematics Colloquium, Otago University, December 2010

Research Supervision

2015–	PhD	S. Amirinezhad: Singularities of Geared Mechanisms
2015	PhD	L. Kempthorne: Relations between Modern Mathematics and Poetry: Czeslaw Milosz; Zbigniew Herbert; Ion Barbu/Dan Barbilian (co-supervised with M. Sonzogni)
2013	MSc	A. Otaif: Constraint Manifolds for Planar Parallel Manipulators (<i>with Merit</i>)
2013	PhD	M. Daher: Dual Numbers and Invariants of the Euclidean Group
2009	MSc	D. Crook: Polynomial Invariants of the Euclidean Group Action on Multiple Screws (<i>with Distinction</i>)
1999	BSc Hons	R. Hall: Affine Geometry, Contact and the Theory of Singularities
1995	MSc	S. C. Chapman: The Geometry of the Point–Paths Generated by Rigid–Body Motions in 2 and 3 Dimensions (<i>with Distinction</i>)
1992	MSc	C. P. Scott: Real Inflexions of the Four-Bar Coupler Curve

Summer Research Scholarships

2018/19	T. Berry: Dual Quaternions and their Applications in Robot Kinematics
2013/14	L. Kelly: Lie Groups, Robot Manipulators and Singularities
2010/11	J. Fletcher: Lie Groups and the Euclidean Group
2009/10	A. Lindsay: Modelling Populations

Thesis examination

2014	MSc, University of Auckland
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Research grants

- 2016 \$4,465 FHSS Interdisciplinary Research Fund: “Science meets Poetry”; with Marco Sonzogni, Sydney Shep
- 2007 \$7,500 NZ Institute of Mathematics and its Applications for Joint AMS/NZMS Meeting
- 2006 \$7,000 University Research Fund for research database construction (+ Science Faculty research funding to complete)

Fellowships, awards etc

- 2018 Fellow of the NZ Mathematical Society

Other Professional Activities (2010–)

- 2009–12 New Zealand Mathematical Society Treasurer
- 2010 Interview on Saturday Morning with Kim Hill (Radio NZ): Benoit Mandelbrot and Fractals
- 2015 Programme Committee member, IMA Conference on Mathematics of Robotics
- 2016 Convener, NZ Mathematics Colloquium Organising Committee
- 2016– VUW correspondent for NZ Mathematical Society Newsletter
- 2017 Invited speaker, 8th International Summer School on Screw-Based Methods in Robotics, Monash University

Referee: Advances in Applied Mathematics, Advances in Robot Kinematics, ASME J. Mechanical Design, ASME J. Mechanisms & Robotics, Autonomous Robots, IEEE Trans. Robotics, IEEE Trans. Automation Science & Engineering, Int. J. Robotics & Automation, IMA J. Math. Control & Information, Int. J. Robotics Research, Mechanism & Machine Theory, Robotica, Trans. Canadian Society of Mechanical Engineers, Nonlinear Dynamics, IEEE/RSJ Int. Conf. Intelligent Robots & Systems, ASME/IDETC Conferences, NZ J. Mathematics

Reviewer: Mathematical Reviews

Member: NZ Mathematical Society, London Mathematical Society, IEEE (incl. Robotics & Automation Society), American Mathematical Society

Administrative/Management Responsibilities (2010–)*School/Faculty*

- 2000–01 Deputy Head, School of Mathematical and Computing Sciences
- 2001–04 Head, School of Mathematics, Statistics and Computer Science
- 2009–11 Postgraduate Coordinator, Mathematics
- 2010 VUW Special Admissions Mathematics Entry Test Working Group member
- 2010 Mathematics adviser for Engineering Student Diagnostic Test (Faculty of Engineering)

- 2011–12 School representative on Faculty of Science Academic, Learning and Teaching Committee
 2012 Convener Working Party on Mathematics in Engineering
 2013–18 Head, School of Mathematics and Statistics

University

- 2010 Gender and Women’s Studies Decision Panel (TEU nominee)
 2011 Member of Academic Board Grievance Committee
 2012 Convener, Academic Programme Review of Art History
 2013–14 Member of Academic Women at Victoria Steering Group
 2013–18 Steering Group for HoS/CSU Forum
 2014–16 Member, HELT Advisory Group
 2014 Convener, Academic Programme Review of Media Studies
 2014 Member, Academic Audit Head of School interview panel
 2014 Member, appointment committee for Head of School of Education
 2014 Member, appointment committee for Dean of Engineering
 2015 Member, appointment committee for Head of School of Engineering & Computer Science
 2015 Convener, Academic Programme Review of Building Science
 2015 Member, appointment committee for Associate Director, Student Academic Services
 2015, 2018 Member, appointment committee for Head of School of Geography, Environment and Earth Sciences
 2016–18 Member, Steering Group for Research Theme “Spearheading Digital Futures”
 2016–18 Member, Victoria ResBaz Steering Group
 2017–18 Convener, Figure’s 20 VUW–Figure.NZ Partnership Reference Group
 2018 Member, appointment committee for Associate Deans (Undergraduate/Postgraduate)
 2018 Member, appointment committee for Head of School of Architecture
 2018 Member, Toloa Tertiary Scholarships Committee, Ministry for Pacific Peoples
 2018 Member, ACODE Benchmarking Project team