Patrick M. Fitzpatrick

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Personal Information

Born on March 14, 1946 in Youghal, Republic of Ireland; U.S. citizen

Education

B.S. in Mathematics, 1966, Rutgers University
Ph.D. in Mathematics, 1971, Rutgers University

Professional Positions

1996–2007:	Chair, Department of Mathematics, UMd
1994–1996:	Associate Chair for Undergraduate Studies, UMd
1984–present:	Professor, UMd
1979–1984:	Associate Professor, UMd
1975–1979:	Assistant Professor, UMd
1973–1975:	L. E. Dickson Instructor, University of Chicago
1972–1973:	Visiting Assistant Professor, Rutgers University
1971–1972:	Visiting Member, Courant Institute of Mathematical Sciences, N.Y.U.
1977–1978:	Visiting Member, Institute for Physical Sciences and Technology, UMd
1985–1986:	Visiting Member, Institute for Physical Sciences and Technology, UMd
	Selected Visiting Professorships: University of Paris-Orsay, Politecnico di Torino, Universite catholique de Louvain, University of Florence, SISSA

Current Research Interests

My present research interests center on the study of topological methods in nonlinear operator theory, with particular interest in the study of bifurcation of solutions of parametrized families of nonlinear partial differential equations. One aspect of this has been the development of a topological degree for nonlinear Fredholm mappings. The essential novelty of this degree is that it presents a new, precise description of the homotopy property of degree that is needed to establish global bofurcation results for one parameter families of such mappings (see [39], [40], [42] and [43]). Another aspect has been the study of bifurcation criteria for one parameter families of variational problems in which a stable bifurcation criterion has been described in terms of the nonvanishing of spectral flow (see [46], [47], [48] and [49]). Much of this work has been done in collaboration with Jacobo Pejsachowicz of the Politecnico di Torino.

Selected Books

1. P.M. Fitzpatrick and J. Pejsachowicz, *Orientation and the Leray–Schauder Theory for Fully Nonlinear Elliptic Boundary Value problems*, Memoirs of the American Mathematical Society, Vol 101, Number 483, 1993, pp. 1–129, ISBN 0-8218–2544–5.

2. P.M. Fitzpatrick et al., *Topological Methods for Ordinary Differential Equations*, Lecture Notes in Mathematics, No. 1537, 1993, pp. 1–209, Springer–Verlag, ISBN 3–540–56461–6.

3. P.M. Fitzpatrick, *Advanced Calculus (Second Edition)*, Pure and Applied Undergraduate Texts, Vol 5, American Math Society, 2006, pp. 1–580+XIII, ISBN 978-0-8218-4791-6.

4. P.M. Fitzpatrick and Halsey Royden, *Real Analysis, 4th Edition* Pearson (Prentice Hall), 2010, pp. 1-489+X1, ISBN-13 978-0131437470

Research Articles

1. P.M. Fitzpatrick, T. Kato and P. Hess, On the local boundedness of monotonic operators, Proceedings of the Japan Academy, Vol. 48, No. 5 (1972), pp. 275-277.

2. P.M. Fitzpatrick and W.V. Petryshyn. Degree theory for noncompact multivalued vector fields, Bulletin of the American Mathematical Society, Vol. 79, No. 3 (1973), pp. 609-613.

3. P.M. Fitzpatrick, On the structure of the set of solutions of equations involving A-proper mappings, Transactions of the American Mathematical Society, Vol. 189 (1974), pp. 107-131.

4. P.M. Fitzpatrick, Surjectivity results for nonlinear mappings from a Banach space to its dual, Mathematische Annalen, Vol. 204 (1973), pp. 177-188.

5. P.M. Fitzpatrick and W.V. Petryshyn, A degree theory, fixed point theorems and mapping theorems for multivalued noncompact mappings, Transactions of the American Mathematical Society, Vol. 194 (1974), pp. 1-25.

6. P.M. Fitzpatrick, Existence results for equations involving noncompact perturbations of Fredholm mappings, with applications to differential equations, Journal of Mathematical Analysis and Applications, Vol. 66, 1 (1978), pp. 151-177.

7. P.M. Fitzpatrick and W.V. Petryshyn, Galerkin methods in the constructive solvability of nonlinear Hammerstein equations, with applications to differential equations, Transactions of the American Mathematical Society, Vol. 238 (1978), pp. 321-340.

8. P.M. Fitzpatrick, On nonlinear perturbations of second order elliptic boundary value problems, Mathematical Proceedings of the Cambridge Philosophical Society, Vol. 84 (1978), pp. 143-l57.

9. P.M. Fitzpatrick and J. Alexander, The homotopy of certain spaces of nonlinear operators, and its relation to global bifurcation of the fixed points of parametrized condensing operators, Journal of Functional Analysis, Vol. 34 (1979), pp. 87-106.

10. P.M. Fitzpatrick and J. Alexander, Galerkin approximations in several parameter bifurcation problems, Mathematical Proceedings of the Cambridge Philosophical Society, Vol. 86 (1980), pp. 1-12.

11. P.M. Fitzpatrick and J. Alexander, Global bifurcation for solutions of equations involving several parameter multivalued condensing mappings, in Fixed Point Theory, E. Fadell and G. Fournier, Eds., Lecture Notes in Mathematics, No. 886 (1981), Springer–Verlag, pp. 1-19.

12. P.M. Fitzpatrick, Calculating homotopy types and global bifurcation, Metodi Asintotici e Topologici in Problemi Differenziali Non Lineari, L. Boccardo and A. M. Micheletti, Eds., Pitagora Editrici, Bologna, 1982, pp. 231-241.

13. P.M. Fitzpatrick, I. Massabó and J. Pejsachowicz, Global several-parameter bifurcation and continuation theorems: a unified approach via complementing maps, Mathematische Annalen, Vol. 263, (1983), pp. 61-73.

14. P.M. Fitzpatrick, Bifurcation, homotopy and linearization, Journal of Nonlinear Analysis, Volume 123, Number 2 (1988), pp.171-184.

15. P.M. Fitzpatrick and J. Pejsachowicz, Local bifurcation for C^1-Fredholm maps, Proceedings of the American Mathematical Society, Vol. 109, No. 4 (1990), pp. 995-1002.

16. P.M. Fitzpatrick, J. Pejsachowiczand P. Rabier, Topological degree for C^2-Fredholm mappings, Comptes Rendues de L'Académie de Sciences, Paris (1990), t. 311, Série 1, pp. 711-716.

17. P.M. Fitzpatrick and J. Pejsachowicz, Parity and generalized multiplicity, Transactions of the American Mathematical Society, Vol. 326, No. 1 (1991), pp. 281-305.

18. P.M. Fitzpatrick and J. Pejsachowicz, Nonorientability of the index bundle and several–parameter bifurcation, Journal of Functional Analysis, Vol. 98, No. 1 (1991), pp. 42-58.

19. P.M. Fitzpatrick, J. Pejsachowicz and P. Rabier, Topological degree for proper C^2-Fredholm mappings on simply connected domains, Journal für die reine und angewandte Mathematik, 427 (1992), pp. 1-33.

20. P.M. Fitzpatrick, J. Pejsachowicz and P. Rabier, Orientability of Fredholm families and topological degree for orientable nonlinear Fredholm maps, Journal of Functional Analysis, Vol. 124, No. 1 (1994), pp. 1-39.

21. P.M. Fitzpatrick, J. Pejsachowicz and P.Rabier, The degree of proper C^2-Fredholm mappings: The covariant theory, Topological Methods in Nonlinear Analysis, Vol 3 (1994), pp. 325-367.

22. P.M. Fitzpatrick and Maria Testa, The parity of paths of closed Fredholm Operators, Journal of Differential and Integral Equations, Vol 7, No. 3 (1994), pp. 823-846

23. P.M. Fitzpatrick and J. Pejsachowicz, Dopolnenie otobrayenia v singulliarnoi tochkie maksimalnogo ranga (Complementing a map at a singular point of maximal range), Izvestia Vuzov, Vol 2 (1997), pp. 97–107

24. P.M. Fitzpatrick, J. Pejsachowicz and L. Recht, Spectral flow and bifurcation of critical points, Comptes Rendues de L'Académie de Sciences, Paris, t.325, Série 1 (1997), pp. 743–747

25. P.M. Fitzpatrick, J. Pejsachowicz and L. Recht, Spectral flow and bifurcation of critical points of strongly–indefinite functionals; Part I, General theory, Journal of Functional Analysis , Vol 162, No 1 (1999), pp. 52–95

26. P.M. Fitzpatrick, J. Pejsachowicz and L. Recht, Spectral flow and bifurcation of critical points of strongly–indefinite functionals; Part II, Bifurcation of periodic orbits of Hamiltonian systems, Journal of Differential Equations, Vol 163, No 1 (2000), pp 18–40

27. E. Ciriza, P.M. Fitzpatrick and J. Pejsachowicz, Uniqueness of spectral flow, Journal of Mathematical and Computer Modelling, Vol 32, Nos 11–13 (2000), pp. 1495–1501

28. A note on the functional calculus for unbounded self-adjoint operators, Journal of Fixed Point Theory and Applications. 13 (2013). pp. 633-640

29. Absolute Continuity of a Function and Uniform Integrability of its Divided Differences, American Math Monthly, Vol 122 (2015), pp .362-366

30. J. C. Alexander and P. M. Fitzpatrick, Spectral flow is a complete bifurcation invariant for paths of variational problems, Transactions of the American Math Society, pp. 1-18 (to appear)