Curriculum vitae
Alessandro Calamai

Personal Information

- Nazionality: Italian.

- E-mail: `a.calamai@univpm.it`

- URL: `http://www.dipmat.univpm.it/~calamai`

Present Position

• Since November 2018: Associate Professor at Marche Polytechnic University (UNIVPM, Università Politecnica delle Marche), Ancona, Italy.
• Since 2015 I am a member of the Department of Construction, Civil Engineering and Architecture (DICEA).

Appointments and Qualifications

- 2005–2010: Postdoctoral fellow, Department of Mathematical Sciences, at UNIVPM.

- 2013: Winner of the Italian Habilitation for Associate Professorship (Abilitazione scientifica nazionale II fascia).

- 2010–2018: Assistant Professor (Ricercatore) at UNIVPM.

Education

- 2001: Degree in Mathematics (Italian Laurea) with full marks, University of Florence.
  Thesis: *"Metodi topologici nei problemi ai limiti per equazioni differenziali ordinarie (Topological methods in Boundary Value Problems for Ordinary Differential Equations)"*.
  Advisor: Prof. Massimo Furi.

- 2005: Ph.D. in Mathematics, University of Florence.
  Thesis: *"A degree theory for a class of noncompact perturbations of Fredholm maps"*.
  Advisor: Prof. Massimo Furi.

Visiting Positions

- March-April 2004: Visiting student at Masaryk University, Brno (Czech Republic). Invited by Prof. Z. Došla.

- April 2008: Visiting at Masaryk University, Brno (Czech Republic). Invited by Prof. Z. Došla

- February 2009: Visiting at the University of Würzburg (Germany). Invited by Prof. J. Appell.

- June 2019: Visiting at the University of Bratislava (Slovak Rep.). Invited by Prof. Milan Medved (collaboration with Dr. Michal Pospíšil).

- June 2023: Visiting at the University of Bratislava (Slovak Rep.). Invited by Prof. Michal Pospíšil.

Grants (P.I.)

- GNAMPA-INDAM 2015 grant *"Topological Methods, Dynamical Systems and Applications"* (Principal investigator).

- Italian national grant "FFABR 2017 - Ricercatori" (Principal investigator).

Participation to National Grants

- GNAMPA 2007 grant (P.I. Prof. Francesca Papalini).

- GNAMPA 2011 grant (P.I. Prof. Giovanni Cupini).

- GNAMPA 2012 grant (P.I. Dr. Valentina Taddei).

- GNAMPA 2013 grant (P.I. Dr. Paola Rubbioni)

- GNAMPA 2014 grant (P.I. Dr. Irene Benedetti)

- GNAMPA 2016 grant (P.I. Dr. Serena Matucci)

- GNAMPA 2017 grant (P.I. Dr. Matteo Franca)

- GNAMPA 2019 grant (P.I. Prof. Gennaro Infante)

- GNAMPA 2020/21 grant (P.I. Dr. Stefano Biagi)

- GNAMPA 2022 grant (P.I. Dr. Filomena Cianciaruso)

- PRIN Italian national grant 2022 (P.I. Prof. Gabriele Bonanno)

Research Interests

- Topological methods in nonlinear analysis.

- Topological degree theory. Fixed point index theory. Bifurcation theory.

- Ordinary differential equations and delay differential equations on manifolds.

- Differential-algebraic equations.

- Boundary value problems on unbounded intervals.

- Dynamical Systems. Melnikov Theory.

Publications

1. A. Calamai, *On existence and uniqueness of solutions for ordinary differential equations with nonlinear boundary conditions.* Boll. Unione Mat. Ital. Sez. B Artic. Ric. Mat. (8) **7** (2004), no. 2, 469–481.

2. A. Calamai, *The invariance of domain theorem for compact perturbations of nonlinear Fredholm maps of index zero.* Nonlinear Funct. Anal. Appl. **9** (2004), no. 2, 185–194.

3. P. Benevieri, A. Calamai and M. Furi, *A degree theory for a class of perturbed Fredholm maps.* Fixed Point Theory Appl. **2005** (2005), no. 2, 185–206.

4. P. Benevieri, A. Calamai and M. Furi, *A degree theory for a class of perturbed Fredholm maps II.* Fixed Point Theory Appl. **2006** (2006), Art. ID 27154, 20 pp.

5. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Global branches of periodic solutions for forced delay differential equations on compact manifolds.* J. Differential Equations **233** (2007), no. 2, 404–416.

6. F. Alessio, A. Calamai and P. Montecchiari, *Saddle type solutions for a class of semilinear elliptic equations.* Adv. Differential Equations **12** (2007), no. 4, 361–380.

7. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Forced oscillations for delay motion equations on manifolds.* Electron. J. Diff. Eqns. **2007** (2007), no. 62, 1–5.

8. P. Benevieri and A. Calamai, *Bifurcation results for a class of perturbed Fredholm maps.* Fixed Point Theory Appl. **2008** (2008), Art. ID 752657, 19 pp.

9. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *On forced fast oscillations for delay differential equations on compact manifolds.* J. Differential Equations **246** (2009), no. 4, 1354–1362.

10. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Delay differential equations on manifolds and applications to motion problems for forced constrained systems.* Z. Anal. Anwendungen **28** (2009), no. 4, 451–474.

11. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Retarded functional differential equations on manifolds and applications to motion problems for forced constrained systems.* Adv. Nonlinear Stud. **9** (2009), no. 1, 199–214.

12. A. Calamai, M. Furi and A. Vignoli, *A new spectrum for continuous nonlinear operators in Banach spaces.* Nonlinear Funct. Anal. Appl. **14** (2009), no. 2, 317–347.

13. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Fast forced oscillations for constrained motion problems with delay.* Commun. Appl. Anal. **13** (2009), no. 4, 497–508.

14. A. Calamai, M. Furi and A. Vignoli, *An overview on spectral theory for nonlinear operators.* Commun. Appl. Anal. **13** (2009), no. 4, 509–534.

15. A. Calamai, C. Marcelli and F. Papalini, *A general approach for front-propagation in functional reaction-diffusion equations.* J. Dynam. Differential Equations **21** (2009), no. 4, 567–593.

16. P. Benevieri and A. Calamai, *A Borsuk-type theorem for some classes of perturbed Fredholm maps.* Topol. Methods Nonlinear Anal. **35** (2010), no. 2, 379–394.

17. J. Appell, A. Calamai and A. Schmied, *Yet another spectrum for nonlinear operators in Banach spaces.* Nonlinear Funct. Anal. Appl. **15** (2010), no. 4, 513–532.

18. A. Calamai, *Heteroclinic solutions of boundary value problems on the real line involving singular Φ-Laplacian operators.* J. Math. Anal. Appl. **378** (2011), no. 2, 667–679.

19. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *On the existence of forced oscillations for the spherical pendulum acted on by a retarded periodic force.* J. Dynam. Differential Equations **23** (2011), no. 3, 541–549.

20. A. Calamai, *Branches of harmonic solutions for a class of periodic differential-algebraic equations.* Commun. Appl. Anal. **15** (2011), no. 2,3 and 4, 273–282.

21. A. Calamai and M. Spadini, *Branches of forced oscillations for a class of constrained ODEs: a topological approach.* NoDEA Nonlinear Differential Equations Appl. **19** (2012), no. 4, 383–399.

22. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *On the existence of forced oscillations of retarded functional motion equations on a class of topologically nontrivial manifolds.* Rend. Ist. Mat. Univ. Trieste **44** (2012), 5–17.

23. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *On general properties of retarded functional differential equations on manifolds.* Discrete Contin. Dyn. Syst. **33** (2013), no. 1, 27–46.

24. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *A continuation result for forced oscillations of constrained motion problems with infinite delay.* Adv. Nonlinear Stud. **13** (2013), no. 2, 263–278.

25. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Global continuation of periodic solutions for Retarded Functional Differential Equations on manifolds.* Bound. Value Probl. **2013** 2013:21, 19 pp.

26. A. Calamai and M. Franca, *Mel'nikov methods and homoclinic orbits in discontinuous systems.* J. Dynam. Differential Equations **25** (2013), no. 3, 733–764.

27. L. Bisconti, A. Calamai and M. Spadini, *Periodic solutions of semi-explicit differential-algebraic equations with time-dependent constraints.* Bound. Value Probl. **2014** 2014:179, 19 pp.

28. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Global continuation of forced oscillations of retarded motion equations on manifolds.* J. Fixed Point Theory Appl. **16** (2014), no. 1-2, 273–300.

29. A. Calamai and M. Spadini, *Periodic perturbations of constrained motion problems on a class of implicitly defined manifolds.* Commun. Contemp. Math. **17** (2015), no. 2, 1450027, 19 pp.

30. P. Benevieri, A. Calamai and M. Furi, *On the degree for oriented quasi-Fredholm maps: its uniqueness and its effective extension of the Leray–Schauder degree.* Topol. Methods Nonlinear Anal. **46** (2015), no. 1, 401–430.

31. A. Calamai and G. Infante, *Nontrivial solutions of boundary value problems for second order functional differential equations.* Ann. Mat. Pura Appl. **195** (2016), no. 3, 741–756.

32. A. Calamai, M.P. Pera and M. Spadini, *Multiplicity of forced oscillations for the spherical pendulum acted on by a retarded periodic force.* Nonlinear Analysis **151** (2017), 252–264.

33. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *On the persistence of the eigenvalues of a perturbed Fredholm operator of index zero under nonsmooth perturbations.* Z. Anal. Anwendungen **36** (2017), no. 1, 99–128.

34. A. Calamai and A. Sfecci, *Multiplicity of periodic solutions for systems of weakly coupled parametrized second order differential equations.* NoDEA Nonlinear Differ. Equ. Appl. **24** (2017), no. 1, Art. 4, 17pp.

35. A. Calamai, J. Diblík, M. Franca and M. Pospíšil, *On the position of chaotic trajectories.* J. Dynam. Differential Equations **29** (2017), no. 4, 1423–1458.

36. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *On general properties of n-th order retarded functional differential equations.* Rend. Istit. Mat. Univ. Trieste **49** (2017), 73–93.

37. A. Calamai, M.P. Pera and M. Spadini, *Multiplicity of forced oscillations for scalar retarded functional differential equations.* Math. Methods Appl. Sci. **41** (2018), no. 5, 1944–1953.

38. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Global continuation of the eigenvalues of a perturbed linear operator.* Ann. Mat. Pura Appl. **197** (2018), no. 4, 1131–1149.

39. A. Calamai, C. Marcelli and F. Papalini, *Boundary value problems for singular second order equations.* Fixed Point Theory Appl. **2018**, 2018:20, 22 pp.

40. A. Calamai, M.P. Pera and M. Spadini, *Branches of forced oscillations induced by a delayed periodic force.* Adv. Nonlinear Stud. **19** (2019), no. 1, 149–163.

41. S. Biagi, A. Calamai and F. Papalini, *Heteroclinic solutions for a class of boundary value problems associated with singular equations.* Nonlinear Analysis **184** (2019), 44–68.

42. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Global continuation in Euclidean spaces of the perturbed unit eigenvectors corresponding to a simple eigenvalue.* Topol. Methods Nonlinear Anal. **55** (2020), no. 1, 169–184.

43. S. Biagi, A. Calamai and F. Papalini, *Existence results for boundary value problems associated with singular strongly nonlinear equations.* J. Fixed Point Theory Appl. **22** (2020), no. 3, Paper No. 53, 34 pp.

44. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Global persistence of the unit eigenvectors of perturbed eigenvalue problems in Hilbert spaces.* Z. Anal. Anwend. **39** (2020), no. 4, 475–497.

45. S. Biagi, A. Calamai and G. Infante, *Nonzero positive solutions of elliptic systems with gradient dependence and functional BCs.* Adv. Nonlinear Stud. **20** (2020), no. 4, 911–931.

46. S. Biagi, A. Calamai, C. Marcelli and F. Papalini, *Boundary value problems associated with singular strongly nonlinear equations with functional terms.* Adv. Nonlinear Anal. **10** (2021), no. 1, 684–706.

47. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *Global persistence of the unit eigenvectors of perturbed eigenvalue problems in Hilbert spaces: the odd multiplicity case.* Mathematics **2021**, 9(5), 561.

48. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *A degree associated to linear eigenvalue problems in Hilbert spaces and applications to nonlinear spectral theory.* J. Dynam. Differential Equations **34** (2022), no. 1, 555–581.

49. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *The Brouwer degree associated to classical eigenvalue problems and applications to nonlinear spectral theory.* Topol. Methods Nonlinear Anal. **59** (2022), no. 2A, 499–523.

50. S. Biagi, A. Calamai and G. Infante, *Nonzero positive solutions of fractional Laplacian systems with functional terms.* Math. Nachr. **296** (2023), no. 1, 102–121.

51. A. Calamai, M.P. Pera and M. Spadini, *Periodic perturbations of reducible scalar second order functional differential equations.* Electron. J. Qual. Theory Differ. Equ. **2023**, Paper No. 18, 23 pp.

52. A. Calamai and G. Infante, *An affine Birkhoff–Kellogg type result in cones with applications to functional differential equations.* Math. Meth. Appl. Sci. **46** (2023), no. 11, 11897–11905.

53. P. Benevieri, A. Calamai, M. Furi and M.P. Pera, *An infinite dimensional version of the intermediate value theorem.* J. Fixed Point Theory Appl. **25** (2023), no. 3, Paper No. 70.

54. A. Calamai and G. Infante, *On fourth order retarded equations with functional boundary condition: a unified approach.* "Discrete and Continuous Dynamical Systems - Series S", to appear.

55. A. Calamai and G. Infante, *Nontrivial solutions of a parameter-dependent heat flow problem with deviated arguments.* To appear in: "Topological Methods for Delay and Ordinary Differential Equations – With Applications to Continuum Mechanics", P. Amster and P. Benevieri (Eds.)

56. A. Calamai, M.P. Pera and M. Spadini, *Branches of forced oscillations for a class of implicit equations involving the Φ-Laplacian.* To appear in: "Topological Methods for Delay and Ordinary Differential Equations – With Applications to Continuum Mechanics", P. Amster and P. Benevieri (Eds.)

Talks

- March 2004: *On existence and uniqueness of solutions for ordinary differential equations with nonlinear boundary conditions*, Masaryk University, Brno, Czech Republic.

- August 2004: *The invariance of domain theorem for compact perturbations of nonlinear Fredholm maps of index zero*, "Conference on fixed point theory and its applications", Montreal, Canada.

- September 2004: *On existence and uniqueness of solutions for ordinary differential equations with nonlinear boundary conditions*, Ancona.

- March 2006: *A degree theory for a class of perturbed Fredholm maps*, Firenze.

- October 2006: *Global branches of periodic solutions for forced delay differential equations on compact manifolds*, Levico Terme (Trento).

- June 2007: *Delay differential equations on manifolds and applications to motion problems for forced constrained systems*, Firenze.

- June 2007: *Delay differential equations on manifolds and applications to motion problems for forced constrained systems*, "Joint International Meeting UMI-DMV", Perugia.

- August 2004: *Delay differential equations on manifolds and applications to motion problems for forced constrained systems*, "EQUADIFF 07", Wien.

- September 2007: *Risultati recenti in teoria spettrale non lineare [Recent results in nonlinear spectral theory]*, "Convegno UMI", Bari.

- November 2007: *A general approach for front-propagation in functional reaction-diffusion equations*, Modena.

- April 2008: *Bifurcation results for delay differential equations on manifolds and applications*, Firenze.

- April 2008: *Front propagation in non-local reaction-diffusion equations*, Masaryk University, Brno, Czech Republic.

- April 2008: *Front propagation in non-local reaction-diffusion equations*, Czech Republic Science Academy, Prague (invited by Prof. Milan Tvrdy).

- May 2008: *Front propagation in non-local reaction-diffusion equations*, "AIMS Conference on Dynamical Systems and Differential Equations", Arlington, Texas (USA).

- June 2008: *Degree theory for a class of perturbed Fredholm maps: properties and applications*, conference FAMA'08, Amantea (Cosenza).

- September 2008: *Front propagation in non-local reaction-diffusion equations*, "Conference on Boundary Value Problems", Santiago de Compostela, Spain.

- February 2009: *An introduction to spectral theory for nonlinear operators*, University of Wurzburg, Germany.

- May 2009: *Continuation results for delay differential equations on manifolds and applications*, University of Pau, France.

- July 2009: *Continuation results for retarded functional differential equations on manifolds and applications to the spherical pendulum*, Ancona.

- July 2009: *Continuation results for forced oscillations of constrained motion problems with infinite delay*, "EQUADIFF 12", Brno, Czech Republic.

- April 2010: *Continuation results for forced oscillations of constrained motion problems with infinite delay and applications to the retarded spherical pendulum*, Messina.

- May 2010: *Branches of harmonic solutions for a class of periodic differential-algebraic equations*, Dresden, Germany.

- June 2010: *Branches of harmonic solutions for a class of periodic differential-algebraic equations*, Glasgow, GB.

- May 2011: *Rami di oscillazioni forzate per equazioni algebro-differenziali: un approccio topologico [Branches of forced oscillations for differential-algebraic equations: a topological approach]*, Firenze.

- June 2011: *Persistence of homoclinic trajectories in discontinuous systems*, Ancona.

- September 2011: *Oscillazioni forzate per equazioni di moto vincolato con ritardo infinito e applicazioni al pendolo sferico [Forced oscillations for constrained motions equations with infinite delay and applications to the spherical pendulum]*, "Convegno UMI", Bologna.

- July 2013: *Continuation results for retarded functional differential equations on manifolds*, Torino.

- August 2013: *Forced oscillations for second order ODEs on a class of implicitly defined manifolds*, "EQUADIFF 13", Prague, Czech Republic.

- November 2013: *Oscillazioni forzate per equazioni del secondo ordine su varietà definite implicitamente [Forced oscillations for second order ODEs on implicitly defined manifolds]*, Firenze.

- June 2014: *Global continuation of periodic solutions for retarded functional differential equations on manifolds*, Firenze.

- July 2014: *On the uniqueness of the topological degree for quasi-Fredholm maps*, Madrid, Spain.

- September 2014: *Melnikov theory for discontinuous systems*, Homburg, Germany.

- October 2014: *Melnikov theory for discontinuous systems*, Brno University of Technology, (invited by Prof. Josef Diblik).

- June 2016: *Teoria di Melnikov per sistemi discontinui [Melnikov theory for discontinuous systems]*, GNAMPA conference, Montecatini Terme.

- September 2021: *Positive solutions of fractional Laplacian systems with functional terms*, Two Days Workshop in Nonlinear Analysis 2021, online conference.

- February 3023: *Soluzioni positive di sistemi con laplaciano frazionario e termini funzionali [Positive solutions of fractional Laplacian systems with functional terms]*, Cosenza.

- July 2023: *"Birkhoff–Kellogg type results in cones with applications"*, Będlewo, Poland.

- October 2023: *"Birkhoff–Kellogg type results in cones with applications"*, Progress in Mathematics towards Industrial Applications, online conference.

Organization of Workshops and Seminars

- I co-organized the conferences

  - *International workshop on Ordinary Differential Equations and Applications*, Ancona 15–17 September 2010.
  - *International workshop on Non-Autonomous Differential Equations*, Ancona 27 June 2011.
  - *"GEDO2018: Giornate di Equazioni Differenziali Ordinarie: metodi e prospettive"*, Ancona, 27–29 September 2018.
  - *"Non-Autonomous Dynamical Systems and Applications: International Workshop on the occasion of Flaviano Battelli's retirement"*, Ancona, 10–11 September 2019.
  - *"International workshop on Recent trends on Dynamical Equations"*, Ancona, 24–25 October 2019.

- In the Years 2006/07 and 2012/13 I co-organized with Dr. Matteo Franca a seminar on *Differential Equations and Dynamical Systems*, in Ancona.

Teaching Experience

Undergraduate courses

- September 2005: Preliminary course in Mathematics (24 hrs), Engineering Faculty, University of Florence.

- 2007/08: Analysis III (48 hrs), Engineering Faculty, UNIVPM, Ancona.

- 2008–2011: Mathematical Methods (48 hrs), Engineering Faculty, UNIVPM, Ancona.

- 2011/12: Geometry (72 hrs), Engineering Faculty, UNIVPM, Ancona.

- 2011–2023: Preliminary course in Mathematics (20 hrs), Engineering Faculty, UNIVPM, Ancona.

- 2012–2023: Mathematical Analysis 1 (72 hrs), Engineering Faculty, UNIVPM, Ancona.

- 2013–2023: Mathematical Analysis 2 (72 hrs), Engineering Faculty, UNIVPM, Ancona.

Graduate courses

- 2008/09: two seminars in the Ph.D. course by Dr. Marco Spadini on *"Some arguments in Global Analysis: Leray's fixed point index and Poincaré's translation operator"*. Ph.D. in Mathematics, University of Florence.

Practice sessions

- 2006–2015: Practice sessions, Mathematical Analysis 1 & 2, Mathematical Methods, Engineering Faculty, UNIVPM, Ancona.

Other professional activities

- Member of the Italian Mathematical Union (UMI).

- Member of the GNAMPA-INDAM group.

- Reviewer for "Mathematical Reviews" and "Zentralblatt MATH".

- Referee for the following Journals:

  Abstract and Applied Analysis; *Acta Mathematica Hungarica*; *Analysis (ANLY)*; *Annali dell'Università di Ferrara*; *Applied Mathematics and Computation*; *Boundary Value Problems*; *Bulletin of the Iranian Mathematical Society*; *Bulletin of the London Mathematical Society*; *Bulletin of the Malaysian Mathematical Sciences Society*; *Communications in Applied Analysis*; *Conference Papers in Science*; *Electronic Journal of Qualitative Theory of Differential Equations*; *Journal of Dynamics and Differential Equations*; *Journal of Inequalities and Applications*; *Journal of International Mathematical Virtual Institute*; *Journal of the London Mathematical Society*; *Journal of Mathematical Analysis and Applications*; *Le Matematiche*; *Lithuanian Mathematical Journal*; *Mathematical Methods in the Applied Sciences*; *Nonlinear Analysis: Modelling and Control*; *Nonlinear Analysis Series B: Real World Applications*; *Philosophical Transactions of the Royal Society A*; *Pure and Applied Functional Analysis*; *Revista Matemática Complutense*; *Rivista di Matematica della Università di Parma*; *Rocky Mountain Journal of Mathematics*.