Short Curriculum Vitæ (Date - December 2016)

Name - Isabel Maria Narra de Figueiredo (nationality: Portuguese).

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Education

- *"Agregação"* in Mathematics, University of Coimbra, Portugal, 2003 (grade: Unanimity).
- Ph.D. in Mathematics, speciality Applied Mathematics, University Pierre et Marie Curie, Paris, France, 1989, Supervisor: Philippe G. Ciarlet (grade: Très Honorable).
- M.S. in Mathematics, speciality Physics-Mathematics, University of Coimbra, Portugal, 1986 (grade: Very Good).
- B.S. in Mathematics, University of Coimbra, Portugal, 1982 (grade: 17 in 20).

Positions

- since October 7, 2005 – Full Professor at the Department of Mathematics of the Faculty of Science and Technology of the University of Coimbra.
- 1994-2005 – Associate Professor at the Department of Mathematics of the Faculty of Science and Technology of the University of Coimbra.
- 1990-1994 – Assistant Professor at the Department of Mathematics of the Faculty of Science and Technology of the University of Coimbra.
- 1986-1989 – Ph.D. student, Université Pierre et Marie Curie, Paris, France.
- 1982-1986 – Teaching Assistant, at the Department of Mathematics of the Faculty of Science and Technology of the University of Coimbra.

Current Research Interests - Applied Mathematics (variational methods, numerical analysis and optimization). Applications in mechanics: elasticity and piezoelectricity. Applications in bio-medicine: variational image processing, inverse problems, level set methods, convection-diffusion equations.

Contents

1 Research Projects with Industry

- Principal investigator : *Smartphone Applications – Emergency Signal Detection and Fall Detection.* (2015-2017)

  Research project in partnership with Oncaring (http://oncaring.com/)

- Principal investigator : *Image processing in ophthalmology for diabetic patients – a new technology.* (2013-2016)

  Research project in partnership with Critical Health (http://www.critical-health.com/) http://www.uc.pt/tomenota/2013/112013/09122013_3

2 Research Funding / Grants

- Principal investigator : *Advances in Image Processing and Inverse Problems: Applications in Medical and Earth Observation Imagery, and Biomathematics*, funded by the Science and Technology Portuguese Foundation in the 2012 call on Mathematics (duration: 24 months, starting date: July 2013). PTDC/MAT-NAN/0593/2012.

- Principal investigator : *Aberrant Crypt Foci and Human Colorectal Polyps: mathematical modelling and endoscopic image processing*, funded by the UTAustin|Portugal program (http://www.utaustinportugal.org/) in the 2008 call on Mathematics (duration: 48 months, starting date: July 2009). UTAustin/MAT/0009/2008.

- Principal investigator : *Mathematical Analysis of Piezoelectric Problems*, funded by the Science and Technology Portuguese Foundation (duration: 36 months, starting date: March 2005). POCI/MAT/59502/2004.

- Principal investigator : *Variational Models and Optimization*, funded by the Science and Technology Portuguese Foundation (duration: 36 months, starting date: July 1996). PRAXIS/PCEX/C/MAT/38/96.

- Principal investigator of the Portuguese Team : *Shells – Mathematical Modelling and Analysis, Scientific Computing*, funded by the European Community "Human Capital and Mobility" Program (duration: 36 months, starting date: January 1995, principal investigator: Philippe G. Ciarlet). Contract: ERBCHRXCT 940536.

- Member : *New materials, adaptive systems, and their nonlinearities: modelling, control and numerical simulation*, November 2002 - October 2006. This project was supported by the European Commission's 5th Framework Programme http://www.cordis.lu/fp5/ identifier number HPRN-CT-2002-00284 (Principal investigator: Bernadette Miara).

- Member : *Nonlinear Partial Differential Equations and Interfaces Problems*, funded by the Science and Technology Portuguese Foundation. POCTI/34471/MAT/2000, September 2000 - August 2003 (Principal investigator : José Francisco Rodrigues).

- Member : *Shells: Mathematical Modelling and Analysis, Scientific Computing*, January 1995 - December 1997. This project was supported by the European Community "Human Capital and Mobility" Program, contract ERBCHRXCT 940536 (Principal investigator: Philippe G. Ciarlet).

- Member : *Junctions in Elastic Multi-Structures*, January 1990 - December 1992. This project was supported by the European Community "S.C.I.E.N.C.E." Program, EEC Project PL 890518, contract SC1 0473-C (EDB) (Principal investigator: Philippe G. Ciarlet).

3 Boards

- Executive board of CIM (International Center for Mathematics),

  2016–2019 and 2008–2011 (http://www.cim.pt/).

- Member of the "General Council" of IACM (International Association for Computational Mechanics, http://www.iacm.info/spacehome/1/0), since 2015.
- Member of ECCAM (ECCOMAS Committee of Computational and Applied Mathematics), since April 2003 (http://www.eccomas.org/).
- Executive board of APMTAC (Portuguese Association of Theoretical, Applied and Computational Mechanics), since 2004 (http://www-ext.lnec.pt/APMTAC/welcome.html).

4 Supervision experience

7 Post-Doctoral, 4 PhD, and 4 Msc (a detailed list is available in FCT (Fundação para a Ciência e a Tecnologia) - Public Key : J0138885YJ5).

1. Image processing - optimization methods. (Post-Doctoral, January 2015 - June 2015).

   Mahdi Dodangeh (funding: FCT project PTDC/MAT-NAN/0593/2012).

   Currently, Doctor Mahdi Dodangeh is a postdoctoral research fellow at Shiraz University of Medical Sciences, Shiraz, Iran.

2. Image processing - contrast enhancement and optical flow. (Post-Doctoral, January 2015 - June 2015).

   Somayeh Gholami (funding: FCT project PTDC/MAT-NAN/0593/2012)

3. Image processing - image registration and applications to Wireless capsule endoscopy. Problems in E-health. (Post-Doctoral, March 2014 - June 2015).

   Luís Pinto (funding: FCT project PTDC/MAT-NAN/0593/2012)

4. Imaging sciences - medical applications (Post-Doctoral, June 2012 - September 2014).

   Sunil Kumar (funding: FCT projects - UTAustin/MAT/0009/2008 and PTDC/MAT-NAN/0593/2012).

   Currently Doctor Sunil Kumar is Assistant Professor in the Department of Mathematical Sciences at Indian Institute of Technology (BHU), Varanasi, India.

5. Polyp detector method for wireless capsule endoscopic images (Post-Doctoral, June 2012 - July 2012).

   Alexander Mamonov (funding: UT Austin / Portugal Program, http://www.utaustinportugal.org/)

   Currently, Doctor Alexander Mamonov is at the University of Houston, Department of Mathematics, USA.

6. Imaging sciences and medical applications (gastroenterological wireless capsule images) (Post-Doctoral, January 2010 - March 2011).

   Surya Prasath (funding: FCT projects - UTAustin/MAT/0009/2008 (1 year) and CMUC (3 months)).

   Currently, Doctor V.B. Surya Prasath is a postdoctoral research fellow at the Department of Computer Science, University of Missouri-Columbia, USA.

7. Optimal control problems for piezoelectric plates (Post-Doctoral, October 2005 - July 2006).

   Georg Stadler (funding: CMUC, Center for Mathematics of the University of Coimbra, Portugal)

   Currently Doctor Georg Stadler is at Courant Institute of Mathematical Sciences, New York University, USA.

8. Variational image segmentation (PhD, October 2009 - September 2012).

   Juan Carlos Moreno Briceño - PhD in Mathematics, University of Coimbra, Portugal.

   Currently Doctor Juan Carlos Moreno Briceño is Invited Assistant Professor at Department of Informatics at the Universidade da Beira Interior, Portugal.

9. Inverse problems in piezoelectricity (PhD, in collaboration with University of Santiago de Compostela, Spain, May 2008 - November 2011).

   Rebeca Martínez - PhD in Mathematics, University of Santiago de Compostela, Spain.

10. Piezoelectric laminated plates (PhD, September 2005 - October 2008).

    José Carvalho - PhD student.

    Currently José Carvalho is Professor at the Dep. of Mathematics, Instituto Politécnico de Setúbal, Setúbal, Portugal.

11. Sensitivity analysis in adaptive elasticity (PhD, May 2004 - May 2007).

    Cecília Pinto- PhD in Mathematics, University of Coimbra, Portugal.

    Currently Doctor Cecília Pinto is Professor at the Dep. of Mathematics, Instituto Politécnico de Viseu - Escola Superior de Tecnologia e Gestão de Viseu, Portugal.

12. Acceleration of computer-assisted image inspection algorithms in medical scenarios (Msc thesis, January- September 2014).

    Carlos Graça - Integrated Master in Electrical and Computer Engineering, University of Coimbra, Portugal.

13. Endoscopic Image Segmentation using Parallel Computing on GPUs with CUDA (Msc thesis, January- September 2012).

    Marco Filipe Santos Martins - Integrated Master in Electrical and Computer Engineering, University of Coimbra, Portugal.

14. Analysis and numerical solution of some problems in structural optimization (Msc thesis, February 2000-2002).

    Silvério Simões Rosa - Master in Mathematics, University of Coimbra, Portugal.

    Currently Doctor Silvério Simões Rosa is Assistant Professor at the Dep. of Mathematics, University of Beira Interior, Portugal.

15. Mathematical analysis of a laminated shell model (Msc thesis, February 1995 -1997).

    José Alexandre Martins - Master in Mathematics, University of Coimbra, Portugal.

    Currently José Alexandre Martins is Professor at Escola Superior de Turismo e Telecomunicações – Instituto Politécnico da Guarda, Portugal.

5 Communications in scientific meetings

72 talks (15 invited) in international congresses, 11 talks (6 invited) in national congresses and 18 seminars (a detailed list is available in FCT (Fundação para a Ciência e a Tecnologia) - Public Key : J0138885YJ5).

5 Recent Communications

1. UT Austin | Portugal Workshop on Nonlinear Mechanics and Applications in Life Sciences, October 27-29, 2016, IST, Lisbon, Portugal.

   Isabel Narra Figueiredo : *Biometric based identification using retinal fundus images.*

2. Conference on Numerical and Multi-scale issues for Partial and Integral Differential Equations, October 14th to October 17th, 2015, Institute for Computational Engineering and Sciences (ICES), at the University of Texas at Austin, Austin, USA. (Event dedicated to Bjorn Engquist's pioneer work and accomplishments).

   Isabel M.N. Figueiredo, Carlos Leal, Giuseppe Romanazzi, Bjorn Engquist : *An Homogenization Approach for Simulating Aberrant Crypt Foci Dynamics.*

3. 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2015), Hamburg, Germany, September 28 - October 02, 2015.

   http://www.iros2015.org/

   Workshop - Robotic endoscopic capsules for gastrointestinal screening, diagnosis and therapy: achievements and future challenges.

   http://sssa.bioroboticsinstitute.it/workshops/REC2015

   Isabel N. Figueiredo, Carlos Leal, Luís Pinto, Pedro N. Figueiredo, and Richard Tsai : *Wireless Capsule Endoscope Tracking based on Multiscale Elastic Image Registration.*

4. 4th International Conference on Engineering Optimization (EngOpt 2014) Lisbon, September 8 – 11, 2014. (http://www.dem.ist.utl.pt/engopt2014/)

   Isabel N. Figueiredo, Carlos Leal, Luís Pinto : *Fall detection modeling based on inverse problems.*

5. Computational Modeling of Objects Presented in Images: Fundamentals, Methods and Applications (4th CompIMAGE 2014) Conference, Pittsburgh, USA, September 3 – 5, 2014. (http://jessicaz.me.cmu.edu/CompImage2014/)

   Isabel N. Figueiredo, Júlio S. Neves, Susana Moura, Carlos Manta Oliveira, and João Diogo Ramos : *Pattern Classes in Retinal Fundus Images based on Function Norms.*

6 Conference organizer and scientific committees

7 Events

1. Member of the Scientific Committee of **VI ECCOMAS Thematic Conference on Computational Vision and Medical Image Processing (VIPIMAGE 2017)**, Porto, Portugal, October 18-20, 2017.

   https://paginas.fe.up.pt/VIPIMAGE/

2. Member of the Scientific Committee of **Congress on Numerical Methods in Engineering - CNM2017**, Valencia, Spain, 3 - 5 July, 2017.

   http://congress.cimne.com/cmn2017/eng/default.asp

3. Member of the Scientific Committee of Computational Applied Mathematics, of **ECCOMAS Congress 2016 (7th European Congress on Computational Methods in Applied Sciences and Engineering)**, Crete, Greece, June 5-10, 2016.

   http://www.eccomas2016.org/

4. Member of the *Scientific Committee on Computational Applied Mathematics* of **11th. World Congress on Computational Mechanics (WCCM XI), the 5th. European Conference on Computational Methods (ECCM V) and the 6th. European Conference on Computational Fluid Dynamics (ECFD VI)**, 20-25 July 2014, Barcelona, Spain.

   (http://www.wccm-eccm-ecfd2014.org/frontal/default.asp)

5. Member of the *International Scientific Committee* do **10th World Congress on Computational Mechanics (WCCM 2012)**, São Paulo, Brazil, 8 -13 July 2012.

6. Main organizer of the **Summer School and Workshop on Imaging Sciences and Medical Applications**, June 15-23, Coimbra, Portugal, 2010.

7. Main organizer of the **Thematic Term 2003 - Mathematics and Engineering**, funded by the International Center for Mathematics (CIM).

7 Member of Academic Committees

25 PhD juries, 2 juries of "Agregação" in Mathematics, 14 Msc juries, 7 juries for academic positions, 17 Scientific prize juries, 11 juries of assessment of Postdoctoral research positions and PhD and Msc scholarships funded by FCT (Fundação para a Ciência e a Tecnologia of Portugal), 1 jury for a grant evaluation in the "ERC Consolidator Grant 1st Call - 2013" of the European Research Council.

8 Courses taught

7 Bsc courses (Elementary and Advanced Calculus, Functional Analysis, Measure Theory, Distributions, Mechanics, Differential Geometry, Fourier Analysis) and 3 Msc courses (Operator

Theory, Finite Elements, Numerical Methods in Mechanics) at the University of Coimbra, and 1 PhD course (Computational Mathematics) at the University of Porto, Portugal. Supervision of 18 monographs at the University of Coimbra. Supervision of 3 internships at High Schools.

9 Grants

- 1986-1989 (3 years) – PhD grant of the French Government.
- 1993 (4 months) – Post-doctoral grant of JNICT (Junta Nacional de Investigação Científica e Tecnológica of Portugal).
- 1994 (one month) – Post-doctoral grant of Fundação Calouste Gulbenkian.

10 Post-doctoral training

- *Exact controllability and asymptotic methods*, in collaboration with Enrique Zuazua, 1993.

  Universidad Complutense de Madrid (Departament of Applied Mathematics), Madrid, Spain.

- *Shape optimization problems*, in collaboration with Giuseppe Buttazzo, 1995.

  University of Pisa (Departament of Mathematics), Pisa (Italy).

11 Award

Doutor João Farinha Award of the Department of Mathematics of the Faculty of Sciences and Technology of the University of Coimbra, for the student who finishes a B.S. in Mathematics with the highest GPA.

12 Languages

- Portuguese (mother tongue).
- French (Diplôme Supérieur d'Etudes Français Modernes, Alliance Française, 1979).
- English (First Certificate in English, University of Cambridge, 1978).

13 Refereeing

- *Acta Bioteoretica*
- *Applied Mathematics and Computation*
- *AMSE Journal of Applied Mechanics*
- *Applicable Analysis*
- *Asymptotic Analysis*
- *Biomedical Signal Processing and Control*

- *Computers in Biology and Medicine*
- *Computers and Mathematics with Applications*
- *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*
- *Computer Methods and Programs in Biomedicine*
- *Computers and Structures*
- *Communications in Mathematical Sciences (CMS)*
- *European Journal of Applied Mathematics.*
- *ESAIM: Control, Optimisation and Calculus of Variations*
- *IEEE Transactions on Image Processing*
- *IMA Journal of Numerical Analysis*
- *International Journal of Solids and Structures*
- *International Journal of Computer Assisted Radiology and Surgery*
- *Investigação Operacional*
- *Journal of Visual Communication and Image Representation*
- *Journal of Elasticity*
- *Knowledge-Based Systems*
- *Mathematical Models and Methods in Applied Sciences*
- *Mathematics and Mechanics of Solids*
- *Mechanics Research Communications*
- *Nonlinear Analysis Series B: Real World Applications*
- *Optimization and Engineering*
- *Portugaliae Mathematica*
- *Research on Biomedical Engineering*
- *The Journal of Mobile User Experience*

14 Publications

89 publications : 1 PhD thesis, 1 Msc thesis, 4 books as editor, 6 articles in chapters of books, 42 articles in international scientific periodicals with referees, 29 articles in conference proceedings, 6 lectures notes (a publication list is available in http://www.mat.uc.pt/˜isabelf/publica.html).

10 Recent Publications

1. Isabel N. Figueiredo, Giuseppe Romanazzi, Carlos Leal, Bjorn Engquist : *An Homogenization Model for Aberrant Crypt Foci*, **SIAM Journal on Applied Mathematics**, Vol. 76, No. 3, 1152-1177, 2016.

2. Isabel N. Figueiredo, Sunil Kumar, Júlio S. Neves, Susana Moura, Carlos M. Oliveira, João D. Ramos: *Automated retina identification based on multiscale elastic registration*, **Computers in Biology and Medicine**, 79, 130-143, 2016.

3. Isabel N. Figueiredo, Carlos Leal, Luis Pinto, Jason Bolito, André Lemos : *A Smartphone Application for Emergency Signal Detection*, **Medical Engineering & Physics**, Vol. 38 (9), 1021-1027, 2016.

4. Isabel N. Figueiredo, Sunil Kumar, Carlos Manta Oliveira, João Diogo Ramos, Bjorn Engquist : *Automated Lesion Detectors in Retinal Fundus Images*, **Computers in Biology and Medicine**, Volume 66, (2015) 47 – 65.

5. Alexander V. Mamonov, Isabel N. Figueiredo, Pedro N. Figueiredo, Yen-Hsi Richard Tsai: Automated Polyp Detection in Colon Capsule Endoscopy, **IEEE Transactions on Medical Imaging**, 33 (7), (2014) 1488-1502.

6. Isabel N. Figueiredo, Carlos Leal: Physiologic Parameter Estimation Using Inverse Problems **SIAM Journal on Applied Mathematics** 73(3), (2013) 1164–1182.

7. Isabel N. Figueiredo, Pedro Figueiredo, Nuno Almeida : Image-driven parameter estimation in absorption-diffusion models of chromoscopy, **SIAM Journal on Imaging Sciences**, 4, 3 (2011) 884–904.

8. Isabel N. Figueiredo, Carlos Leal, Giuseppe Romanazzi, Bjorn Engquist, Pedro N. Figueiredo: A convection-diffusion-shape model for aberrant colonic crypt morphogenesis, **Computing and Visualization in Science**, 14, 4 (2011) 157-166.

9. Pedro N. Figueiredo, Isabel N. Figueiredo, Surya Prasath and Richard Tsai : Automatic polyp detection in PillCam COLON 2 capsule images and videos - preliminary feasibility report, **Diagnostic and Therapeutic Endoscopy** , vol. 2011, Article ID 182435, 7 pages, 2011 (doi:10.1155/2011/182435).

10. I. N. Figueiredo, P. N. Figueiredo, G. Stadler, O. Ghattas, A. Araújo : Variational image segmentation for endoscopic human colonic aberrant crypt foci, **IEEE Transactions on Medical Imaging**, 9, 4 (2010) 998-1011.

15 2 Books

- António M. Ferreira, Isabel N. Figueiredo, Juha Videman (Editors) : **International Conference on Mathematics and Continuum Mechanics**, CIM (Centro Internacional de Matemática), 30 (2008).

  (available at http://www.cim.pt/files/proceedings_mechanics_2008.pdf).

- Isabel N. Figueiredo, José F. Rodrigues and Lisa Santos (Editors): **Free Boundary Problems: theory and applications**, Series: International Series of Numerical Mathematics Vol. 154, Birkhauser Verlag, Basel, 2007.

16 PhD Thesis

- Isabel M. Narra Figueiredo : **Modèles de Coques Elastiques Non Linéaires, Méthode Asymptotique et Existence de Solutions**, Université Pierre et Marie Curie, France (1989) 127 pages (in French).