

Nicolas Van Goethem

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Belgian & Portuguese
Born: 12 March 1976 in Sorengo (CH)
2 children

1 Scholarly indicators

Database coordinates

Researcher ID (WoS): A-7674-2013
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MR Author ID number: 749820
(van goethem, n*)
zbMATH: van-goethem.nicolas

H-index

ISI (WoS)=11
Scopus=12
Google scholar=17
Researchgate=15

Citations

Google scholar=795
Researchgate=815
ISI (WoS)=427
Scopus=450

2 Research interests

Mathematical modelling in material science: theory, numerics & applications.

Physical and mathematical science of solids:

Continuum mechanics & thermodynamics of defects in solids (damage, fracture & dislocations);
Finite elasticity & linearized elasto-plasticity;
Axiomatic approach to thermodynamics.

Variational methods in material science:

Γ -convergence;
Shape and topological optimization methods: theory and numerics.

Partial differential equations (elliptic & parabolic) and functional analysis;

Geometric measure theory (theory of currents for dislocation modelling);

Differential geometry (non-Riemannian geometry of crystals with defects).

3 Curriculum data

3.1 Current position and affiliation

Professor at the Mathematics Department of the Faculty of Sciences, Lisbon University

Researcher at CEMS.UL (former CMAFcIO research center)

Vice-president of the Mathematics department (former)

Executive board of the Mathematics Department (member)

3.2 Education

Doctorat en Sciences Appliquées, Ecole Polytechnique de Louvain, Université catholique de Louvain (UCL), Louvain-la-Neuve, Belgium

Dissertation: [2] Mesoscopic modelling of the geometry of dislocations and point-defect dynamics in single crystals

Grade: Received on January, 19th, 2007 with “les félicitations du jury”.

Published: Nr. 135/2007, CIACO press, Louvain-la-Neuve, Belgium, 2007
online: <http://edoc.bib.ucl.ac.be:81/>.

Graduate studies in Applied Mathematics: Université catholique de Louvain (UCL), Ecole Polytechnique de Louvain, Louvain-la-Neuve, Belgium

Dissertation: [1] Influence d'un champ magnétique tournant dans le problème de Raleigh-Bénard.

Grade: Received on July, 1999 with “grande distinction”

Primary and secondary cycles: European School of Varese (Italy, until 1992) and Brussels (Belgium, until 1994).

3.3 Qualifying Examinations

8/4/2022: Agregação em Física Matemática e Mecânica dos Meios Contínuos, FCUL

14/11/2014: Italian Associate Professor Qualification in Mathematical Analysis, Probability and Statistics (“abilitazione alle funzioni di professore di seconda fascia in analisi matematica, probabilità e statistica matematica” (endorsed with unanimity).

2007: French qualification for “Maître de Conférence” position in Applied Mathematics (section 26).

3.4 Employment history

Currently: Professor Associado com agregação at FCUL

since 01.04.2008 at FCUL

since 08.04.2022 com agregação

since 01.04.2024 Associado

July 2020-December 2020: Principal researcher at CMAcIO research center:

CEEC2018 programme.

September 2019-June 2020: Invited researcher at CMAFcIO (until February 2020) and FCIências.id (from March 2020).

July 2014 - June 2019: Faculty researcher at the Faculty of Science (Mathematics Department) of the University of Lisbon, Portugal:

iFCT2013 programme.

Dec. 2012-June 2014: Contract researcher at the Functional Analysis Sector, SISSA, Trieste, Italy:

ERC project: “Quasistatic and Dynamic Evolution Problems in Plasticity and Fracture”
(PI: G. Dal Maso) .

April 2008-November 2012: Ciência faculty researcher at CMAF, Lisbon, Portugal:

Ciência 2007 programme.

Jan. 2007- Feb. 2008: Post-doctoral research at the Ecole Polytechnique, Palaiseau, France:
ER-Marie Curie post-doctoral research contract.

Work with G. Allaire on Optimization problems (MULTIMAT Research Training Network.)

Sept. 2000 - Dec. 2006: Doctoral research and teaching assistant at UCL, Belgium:
PhD fellowship & contract of research assistant. *Supervisor: F. Dupret.*

Sept. 2003 - Dec. 2003:

ESR-Marie-Curie fellowship at University College of London, UK.

Work with D. Preiss on Real analysis problems.

Sept. 1999 - Aug. 2000: Internship at the University of Pisa, Italy:
Grant from Belgian CGRI.

Work with G. Buttazzo on Shape optimization problems.

3.5 Competitions, Prizes & Grants

2019: Selected for FCT CEEC2018 (unique principal researcher in Mathematics for this call).

2014: Selected for FCT exploratory research project (MATH2DISLOC–50K euros grant).

2013: Selected for Investigador FCT 2013 call.

2012: Selected for ERC research contract call at SISSA, Trieste (IT).

2008: Selected for FCT Ciência 2007 call.

2006: Selected for Marie Curie ER fellowship call.

2003: Selected for Marie Curie ESR fellowship call.

4 Scientific projects and funding

4.1 Projects and external funding

- As PI:

2014-2019: MATH2DISLOC FCT research project: "Mathematical theory of dislocations: geometry, analysis, and modelling".

- As member:

2012-2014: ERC grant "Quasistatic and Dynamic Evolution Problems in Plasticity and Fracture"

2015-2018: FCT R&D Project: PTDC/EMS-PRO/6678/2014

2008-2012: Jovem Cientista do Nosso Estado (Brasil): Análise de Sensibilidade Topológica na Otimização Estrutural (Edital FAPERJ nº 08/2009)

2008-2012: FCT R&D Project: PTDC/EME-PME/108751/2008

2006-2009: MULTIMAT Marie Curie research and training network ("Multi-scale modelling and characterisation for phase transformations in advanced materials" 2004-2008)

- As collaborator:

GNAMPA project 2015 (Italy): Critical Phenomena in the Mechanics of Materials: a Variational Approach.

Groupement de recherche international (GDRI) Euro-Maghébrin: member since 2014

- Effective member of CMAFcIO research center since 2008 (Excellence center funded by FCT).

4.2 Group coordination

2017-2019: "Mathematical modelling in material science: fracture, dislocations and elastoplasticity".

Description: This research unit within CMAFcIO carries out research in the mathematical modelling and/or analysis of phenomena arising in material science, in particular about solids with defects and singularities such as cracks and dislocations. Variational as well as non-variational techniques are used and developed. Theoretical as well as numerical results are sought. New models, new methods and new algorithms are proposed.

Members:

Riccardo Scala (post-doc, 2017-2018) works on "Dislocation lines in single crystals: mathematical formalism and modelling".

Marco Carocchia (post-doc, 2017-2018) works on "Damage-to fracture models: theory and applications".

Pedro Campos (Gulbenkian novos talentos, 2017-2019): works on "A fundamental approach to Entropy principles" until Jan 2019. From April 2019 work on well posedness for special classes of Navier-Stokes equations and other nonclassical solutions in fluid dynamics.

4.3 Conference & symposium organization, & Scientific committee membership

- International Program Committee member for the 6th IEEE International Conference on Control, Automation and Diagnosis (ICCAD'22), 2022.
- Scientific Committee member for the "Portugal-Italy Conference on Nonlinear Differential Equations and Applications", in Évora, Portugal, on 4,5,6, July 2022.
- Chair of a 8ECM minisymposium: "Nonlinear analysis for continuum mechanics", Portoroz, Slovenia, June 24-25, 2021.
- Keynote lecture & minisymposium chair at the Conference *Dynamics, Equations and Applications*, AGH University of Science and Technology (Kraków, Poland), September 16-20, 2019 (<https://www.dea.agh.edu.pl/>).
- International Program Committee member for the International Conference on "Advances in Engineering and Applied Mathematics" (ICAEAM'19). Lisbon, August 13-14, 2019.
- Scientific Committee member for the conference "Topics in nonlinear analysis: Calculus of variations and PDEs" - *Autumn 2018 Workshop in Lisbon*. Lisbon, October 10-12, 2018 (<https://sites.google.com/view/cvpdelisboa/home>).
- Scientific Committee member for the First CIM-WIAS workshop: *Topics in Applied Analysis and Optimisation (Stochastic, Partial Differential Equations and Numerical Analysis)*. Lisbon, December 6-8, 2017 (<http://cmafcio.ciencias.ulisboa.pt/taao2017>).

5 Written scientific production

5.1 Publications in international peer-reviewed journals (45)

1. M. Carocchia, **N. Van Goethem**, Marco Carocchia and Nicolas Van Goethem, Rigidity and functional properties of $BD_{dev}(\Omega)$, Archive for Rational Mechanics and Analysis (arXiv:2505.23348), 2026.

2025

2. M. Carocchia, **N. Van Goethem**, Iterative blow-ups for maps with bounded $\mathcal{A}$ -variation: A refinement, with application to BD and BV, Adv. Calc. Var., Vol. 18, No. 4, pp. 581-618 (2025) (*ISI IF=1.4; Scimago Q1; Scopus percentile: 83-Analysis*).

2024

3. L. De Luca, R. Scala, **N. Van Goethem**, A new approach to topological singularities via a weak notion of Jacobian for functions of bounded variation, *Indiana Univ. Math. J.*, 73(2), pp. 723–779, (2024)
(*Scimago Q1*).
4. S. Amstutz and **N. Van Goethem**, A second-order model of small-strain incompatible elasticity, *Mathematics and Mechanics of Solids*, 29(3), pp. 503–530, (2024)
(*ISI IF=2.2; Scimago Q1; Scopus percentile: 95–General mathematics*).

2022

5. **N. Van Goethem**, Is Objectivity really an objective concept?, *Ann. Appl. Math.* 38(4), pp. 441–492, (2022).

2021

Xavier, M. and **N. Van Goethem**, Brittle fracture on plates governed by topological derivatives, *Engineering Computations*, 39(1), pp. 421–437, (2021).
(*ISI IF=1.67; Scimago Q2; Scopus percentile: 68–Engineering*).

2020

6. S. Amstutz and **N. Van Goethem**, Existence and asymptotic results for an intrinsic model of incompatible small-strain elasticity, *Discrete and Continuous Dynamical Systems B*, 25 (10), 3769–3805.
(*ISI IF=1.3; Scimago Q2; Scopus Q1*).
7. M. Caroccia, M. Focardi, **N. Van Goethem**, On integral representation of local energy functionals on BD , *SIAM J. Math. Anal.*, 52(4), 4022–4067.
(*ISI IF=7.2; Scimago Q1; Scopus percentile: 85–Analysis*).
8. R. Scala, **N. Van Goethem**, Analytic and geometric properties of dislocation singularities, *Proc. R. Soc. Edinburgh: Section A Math.*, 150(4), 1609–1651.
(*ISI IF=1.0; Scimago Q1; Scopus percentile: 78–General mathematics*).
9. M. Xavier, **N. Van Goethem**, A. Novotny, Hydro-mechanical fracture modelling governed by topological derivatives, *Computer Methods in Applied Mechanics and Engineering*, 365 (15), 112974.
(*ISI IF=1.3; Scimago Q1; Scopus percentile: 98–Computational mechanics*).

2019

10. M. Caroccia and **N. Van Goethem**, Damage-driven fracture with low-order potentials: asymptotic behavior and applications, *ESAIM: M2AN*, 53 (4), 1305–1350, 2019.
(*ISI IF=2.0, Scimago Q1; Scopus percentile: 89–Analysis*).
11. R. Scala, **N. Van Goethem**, A variational approach to single crystals with dislocations, *SIAM J. Math. Anal.*, 51 (1), 489–531, 2019.
(*ISI IF=1.3; Scimago Q1; Scopus percentile: 85–Analysis*).
12. R. Scala, **N. Van Goethem**, Variational evolution of dislocations in single crystals, *J. Nonlinear Sci.*, 29(1), 319–344, 2019.
(*ISI IF=2.0; Scimago Q1; Scopus percentile: 83–Applied mathematics*).

2018

13. M. Xavier, **N. Van Goethem**, A. Novotny, A simplified model of fracking based on the topological derivative concept, *Int. J. Sol. Struct.*, 139–140, 211–223, 2018.
(*ISI IF=2.8; Scimago Q1; Scopus percentile: 92–Applied mathematics*).

2017

14. **N. Van Goethem**, Front migration for the dislocation strain in single crystals, *Commun. Math. Sci.*, 15(7), 1843-1866, 2017.
(*ISI IF=1.3; Scimago Q1; Scopus percentile: 84-General mathematics*).
15. M. Xavier, **N. Van Goethem**, A. Novotny, J.-M. Faria, E. Fancello, Topological Derivative-Based Fracture Modelling in Brittle Materials: A Phenomenological Approach, *Eng. Frac. Mech.*, 179 (15), 13-27, 2017.
(*ISI IF=2.9; Scimago Q1; Scopus percentile: 87-Mechanical engineering*).
16. **N. Van Goethem**, Incompatibility-governed singularities in linear elasticity with dislocations, *Math. Mech. Solids*, 22(8), 1688-1695, 2017.
(*ISI IF=2.1; Scimago Q2; Scopus percentile: 90-General mathematics*).
17. S. Amstutz and **N. Van Goethem**, Incompatibility-governed elasto-plasticity for continua with dislocations, *Proc. R. Soc. Lond., Ser. A*, 473: 20160734, 2017.
(*ISI IF=2.8; Scimago Q1; Scopus percentile: 95-General mathematics*).

2016

18. **N. Van Goethem**, The Frank tensor as a boundary condition in intrinsic linearized elasticity, *J. Geom. Mech.*, 8(4), 391-411, 2016.
(*ISI IF=0.5; Scimago Q3; Scopus percentile: 48-Geometry and topology*).
19. S. Amstutz and **N. Van Goethem**, Analysis of the incompatibility operator and application in intrinsic elasticity with dislocations, *SIAM J. Math. Analysis*, 48 (1), 320-348, 2016.
(*ISI IF=1.3; Scimago Q1; Scopus percentile: 85-Analysis*).
20. R. Scala, **N. Van Goethem**, Constraint reaction and the Peach-Koehler force for dislocation networks, *Math. Mech. Complex. Syst.*, 4 (2), 105-138, 2016.
(*Scimago Q2; Scopus percentile: 77-Numerical analysis*).
21. **N. Van Goethem**, Dislocation-induced linear-elastic strain dynamics by Cahn-Hilliard-type equations, *Math. Mech. Complex. Syst.*, 4 (2), 169-195, 2016.
(*Scimago Q2; Scopus percentile: 77-Numerical analysis*).
22. **N. Van Goethem**, Direct expression of incompatibility in curvilinear systems, *The ANZIAM Journal*, 58, 33-50, 2016.
(*ISI IF=0.3; Scimago Q4; Scopus percentile: 29-Mathematics (miscellaneous)*).
23. R. Scala, **N. Van Goethem**, Currents and dislocations and the continuum scale, *Meth. Appl. Analysis*, 23 (1), 1-34, 2016.

2015

24. G. Maggiani, R. Scala, **N. Van Goethem**, A compatible-incompatible decomposition of symmetric tensors in L^p with application to elasticity, *Math. Meth. Appl. Sc.*, 38 (18), 5217-5230, 2015.
(*ISI IF=1.5; Scimago Q1; Scopus percentile: 87-General mathematics*).
25. **N. Van Goethem**, Cauchy elasticity with dislocations in the small strain assumption, *Appl. Math. Lett.*, 96, 94-99, 2015.
(*ISI IF=3.5; Scimago Q1; Scopus percentile: 92-Applied mathematics*).

2014

26. S. Amstutz, A. Novotny, **N. Van Goethem**, Minimal partitions and image classification with a gradient-free perimeter approximation, *Inv. Pbl. Imag.*, 8 (2), 361-387, 2014 .
(*ISI IF=1.5; Scimago Q1; Scopus percentile: 77-Analysis*).

27. S. Amstutz, A. Novotny, **N. Van Goethem**, Topological sensitivity analysis for elliptic differential operators of order $2m$, *J. Diff. Eqs.*, 256 (4), 1735-1770, 2014.
(*ISI IF=1.9; Scimago Q1; Scopus percentile: 90-Analysis*).
28. **N. Van Goethem**, Thermodynamical forces in single crystals with dislocations, *Z. ang. Math. Phys.*, 65 (3), 549-586, 2014.
(*ISI IF=1.4; Scimago Q1, Scopus percentile: 89-General mathematics*).
29. **N. Van Goethem**, Fields of bounded deformation for mesoscopic dislocations, *Math. Mech. Solids*, 19 (5), 579-600, 2014.
(*ISI IF=2.1; Scimago Q2; Scopus percentile: 90-General mathematics*).

2013

30. P. Areias, D. Dias-da-Costa, E. B. Pires, **N. Van Goethem**, Asymmetric quadrilateral shell elements for finite strains, *Comp. Mech.*, 52 (1), 81-97, 2013.
(*ISI IF=3.2; Scimago Q1; Scopus percentile: 95-Applied mathematics*).
31. H.G. Silva, P. Areias, **N. Van Goethem**, M. Bezzeghoud, Damage-based fracturing Topics in Applied Analysis and Optimization with electromagnetic coupling, *Comp. Mech.*, 51 (3), 629-640, 2013.
(*ISI IF=3.2; Scimago Q1; Scopus percentile: 95-Applied mathematics*). A simplified model of fracking based on the topological derivative concept
32. P. Areias and **N. Van Goethem**, A finite-strain temperature-dependent ductile fracture model with configurational forces, *Int. J. Fracture*, 178 (1-2), 215-232, 2013.
(*ISI IF=2.9; Scimago Q1; 92: Mechanical engineering*).

2012

33. **N. Van Goethem**, Kröner's formula for dislocation loops revisited, *Mech. Res. Commun.*, 46, 62-70, 2012. (*ISI IF=2.2; Scimago Q1; Scopus percentile: 74-Mechanical engineering*).
34. **N. Van Goethem** and F. Dupret, A distributional approach to the geometry of 2D dislocations at the continuum scale, *Ann. Univ. Ferrara*, 58 (2), 407-434, 2012.
(*Scimago Q3; Scopus percentile: 42-General mathematics*).
35. S. Amstutz and **N. Van Goethem**, Topology optimization methods with gradient-free perimeter approximation, *Interfaces and Free Boundaries*, 14 (3), 401-430, 2012.
(*ISI IF=0.7; Scimago Q1*).
36. **N. Van Goethem** and F. Dupret, A distributional approach to 2D Volterra dislocations at the continuum scale, *Europ. Jnl. Applied Math.*, 23 (3), 417-439, 2012.
(*ISI IF=1.2; Scimago Q2; Scopus percentile: 57-Applied mathematics*).
37. **N. Van Goethem**, A multiscale model for dislocations: from mesoscopic elasticity to macroscopic plasticity, *Journal of Applied Mathematics and Mechanics (ZAMM)*, 92 (7), 514-535, 2012.
(*ISI IF=1.5; Scimago Q2; Scopus percentile: 67-Applied mathematics*).

2011

38. **N. Van Goethem**, Shape optimization for a time-dependent 4th-order equation in a dislocation model, *C. R. Acad. Sci. Paris. Ser. I* 340, 349, 923-927, 2011.
(*ISI IF=0.6; Scimago Q2; Scopus percentile: 57-General mathematics*).
39. G. Allaire, F. Jouve, **N. Van Goethem**, Damage and crack evolution by shape optimization methods, *J. Comput. Phys.* 230 (12), 5010-5044, 2011.
(*ISI IF=2.8; Scimago Q1; Scopus percentile: 94: Numerical analysis*).
40. P. Areias, **N. Van Goethem** and E. B. Pires, A damage model for ductile crack initiation and propagation, *Comp. Mech.* 47 (6), 641-656, 2011.
(*ISI IF=3.2, Scimago Q1; Scopus percentile: 95-Applied mathematics*).

41. **N. Van Goethem**, Strain incompatibility in single crystals: Kröner's formula revisited, *J. Elast.*, 103 (1), 95–111, 2011.
(*ISI IF=1.9; Scimago Q1; Scopus percentile: 74–Mechanical engineering*).

2010

42. **N. Van Goethem**, The non-Riemannian dislocated crystal: a tribute to Ekkehart Kröner, *J. Geom. Mech.*, 2 (3), 303–320, 2010.
(*ISI IF=0.5; Scimago Q3; Scopus percentile: 48–Geometry and topology*).
43. **N. Van Goethem**, A.A. Novotny, Crack Nucleation Sensitivity Analysis, *Math. Meth. Appl. Sc.*, 33 (16), 1978–1994, 2010.
(*ISI IF=1.5; Scimago Q1; Scopus percentile: 87–General mathematics*).

2008

44. **N. Van Goethem**, A. de Potter, N. Van den Bogaert, F. Dupret, Dynamic Prediction of Point Defects in Czochralski Silicon Growth. An Attempt to Reconcile Experimental Defect Diffusion Coefficients with the V/G criterion, *J. Phys. Chem. Solids*, 69, 320–324, 2008.
(*ISI IF=2.8; Scimago Q2; Scopus percentile: 75–Condensed matter physics*).

2004

45. **N. Van Goethem**, Variational problems on classes of convex domains, *Commun. Appl. Analysis*, 8 (3), 353–371, 2004.

5.2 Books (1)

46. NONLINEAR DIFFERENTIAL EQUATIONS AND APPLICATIONS, Portugal-Italy Conference on NDEA, Évora, Portugal, July 4-6, 2022, CIM Series in Mathematical Sci. (Springer), H. Beirão da Veiga, F. Minhós, N. Van Goethem, L. Sanchez Rodrigues eds, 2024.

5.3 Chapters in book (1)

45. S. Amstutz and **N. Van Goethem**, The incompatibility operator: from Riemann's intrinsic view of geometry to a new model of elasto-plasticity, in TOPICS IN APPLIED ANALYSIS AND OPTIMIZATION, CIM Series in Mathematical Sci. (Springer), J. F. Rodrigues and M. Hintermüller eds., 2019. (Hal preprint: hal- 01789190).

5.4 International conference proceedings (1)

46. G. Allaire, F. Jouve, **N. Van Goethem**, A level set method for the numerical simulation of damage evolution, in PROCEEDINGS OF ICIAM 2007 ZÜRICH, R. Jeltsch and G. Wanner eds., EMS, Zürich, 2009

5.5 Forthcoming publications (submitted works)

5.6 Highly-cited papers (source Web of Science)

Article [41] cited 87 times

Article [45] cited 61 times

Article [25] cited 21 times

Article [13] cited 20 times

Article [41] cited 19 times

Article [25] cited 19 times

6 Scientific communication and outreach

6.1 Knowledge transfer

Patented code production for Femagsoft software company for industrial crystal growth. From SOPARTEC (Place de l'Université 1, 1348 Louvain-la-Neuve, Belgique, Nr. d'entreprise: 0402.978.679)

6.2 Public presentations at conferences/workshops/seminars

- Incompatible Deformations in Solids with dislocation microstructure: A Strain-Gradient Approach with Finite Element
 - September 4, 2025, COMPLAS 2025 (XVIII International Conference on Computational Plasticity. Fundamentals and Applications), Barcelona, 2-5 September 2025
 - July 2, 2025, C3M conference (Computational Methods for Multi-scale, Multi-uncertainty and Multi-physics Problems), Porto, 1-4 July 2025
- Integral representation of local energies on BD. Tentative towards $\mathcal{A}$ -free operators.
 - June 25, 2024, Dipartimento di Matematica del Università di Lecce
- Some fracture evolution problems by topological sensitivity analysis
 - December 15, 2023: keynote lecture at ESI workshop "New perspective on Shape and Topology Optimization", Vienna, Austria.
- Incompatibility-governed deformations: a new approach to Elastoplasticity
 - August 25, 2023: contributed talk at ICIAM2023, Tokyo, Japan.
- A new approach to topological singularities
 - October 6, 2022: 8° Iberian Mathematical Meeting, Sevilla, Spain.
 - July 20, 2022: Seminar at Università degli Studi di Palermo, Italy.
- Mathematical modelling in Solid mechanics : an example with fracking
 - November 25, 2020: Seminario DEM, Departamento de Engenharia Mecânica, IST, Lisbon, Portugal.
 - November 5, 2020: Numerical Analysis and Optimization Seminar, Centre for Mathematics of the university of Coimbra, Portugal.
 - September 10, 2020: Encontros Abertos do CMAFeIO. FCUL, Universidade de Lisboa, Portugal.
- Integral representation of local energy functionals on $BD(\Omega)$
 - September 6, 2019: invited talk given at the Congress in honour of Luis Sanchez at the University of Lisbon, Portugal.
- Intrinsic views in continuum mechanics
 - March, 27, 2019: seminar at the Lisbon Polytechnic School of Engineering, Portugal.
 - November, 21, 2018: Colloquium of mathematics, FCUL, Portugal.
- The incompatibility operator: old and new
 - September 19, 2019: Keynote lecture at International conference "Dynamics, Equations and Applications (DEA 2019)" in Krakow, Poland.
 - August 22, 2018: invited talk given at the Workshop "New trends in the variational modeling of failure phenomena" held at the ESI in Vienna, Austria.
- Variational evolution of dislocations in single crystals
 - January 18, 2019: seminar at Università degli studi di Firenze, Italy.
- Dislocations at the continuum scale: current formalism and constraint reaction

- 09/2017: CMAF-CIO/CAMGSD workshop on differential equations, Lisbon (Portugal)
- 08/2014: Workshop on Shape and Topology Optimization with PDE constraints (In honour of J. Sokolowski), LNCC Petropolis, Brazil.
- 07/2014: Workshop on Trends in Non-Linear Analysis, IST Lisbon (Portugal)
- 01/2014 CMAF, Lisboa and IST, Lisboa, Portugal.
- 10/2013: Technische Universität Dortmund, Germany.
- Thermodynamic forces in single crystals with dislocations
 - 10/2013: Workshop on Energy/Entropy-Driven Systems and Applications, WIAS Berlin, Germany.
- Ductile fracture with configurational forces
 - 09/2012: Workshop on plasticity and fracture, Università di Udine, Italy.
 - 05/2012: Phys. Dep., Universidade de Evora, Portugal.
- Topology optimization and Image classification with gradient-free perimeter approximation
 - 03/2015: CIDMA, University of Aveiro, Portugal.
 - 07/2013: CMAF, University of Lisbon, Portugal.
 - 05/2013: LNCC, Petropolis, Brazil.
 - 12/2012: SISSA, Trieste, Italy.
 - 06/2012: Math. Dep. Universidade Nova de Lisboa, Portugal.
 - 08/2011: Benasque school on PDEs, Spain.
- An introduction to dislocation theories
 - 04/2011: Phys. Dep., Universidade de Evora, Portugal.
 - 09/2007: OxMOS/MULTIMAT meeting in Oxford, United Kingdom.
- Damage and crack evolution by shape optimization methods
 - 03/2011: Math. Dep., Univ. d'Avignon, France.
 - 10/2010: Math. Dep., Universidade Nova de Lisboa, Portugal.
 - 08/2010: Conference on Topological Sensitivity Analysis, LNCC, Petropolis, Brazil.
 - 05/2009: Congrès SMAI 2009, la Colle sur Loup, France.
 - 09/2008: MULTIMAT meeting at the Hausdorff centrum, Bonn, Germany.
 - 04/2007: MULTIMAT meeting at the Academy of Science of the University of Prague, Czech Republic.
- Differential geometry with application to dislocation theory and Einstein field equations
 - 02/2010: Grupo de física matemática, Universidade de Lisboa, Portugal.
- An introduction to damage and fracture in elastic materials
 - 10/2008: Two public lectures given at CMAF center, FCUL, Portugal.
- A distributional approach to dislocations
 - 08/2005: International conference of Applied mathematics, Plovdiv, Bulgaria.
- Variational problems on classes of convex domains
 - 10/2003: David Preiss' thursday seminar at University College of London, United Kingdom.
 - 10/2000: Seminar at the mathematics department of UCL, Belgium.
 - 09/2000: Contributed talk at the French Italian German conference on Optimization, Montpellier, France.

06/2000: Seminar at the mathematics department of Pisa university, Italy.

6.3 Conference proceedings as coauthor (13)

H.G. Silva, P. Areias, J. E. Garção, **N. Van Goethem**, M. Bezzeghoud, "Fracture of piezoelectric materials causing electromagnetic emissions", Mathematical modelling and numerical simulations for geophysics (GEOMAT'11).

H.G. Silva, P. Areias, **N. Van Goethem**, M. Bezzeghoud, "Electrification Processes during Solid Fracture Causing Electromagnetic Emissions", CFRAC2011 (CIMNE), Barcelona.

P. Areias, **N. Van Goethem** and E. B. Pires, "Constrained ALE-Based Discrete Fracture in Shells with Quasi-Brittle and Ductile Materials", CFRAC2011 (CIMNE), Barcelona.

G. Allaire, F. Jouve, **N. Van Goethem**, "Shape and topology optimization by the level set method. Application to damage evolution modeling", 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, AIAA, Victoria, British Columbia Canada, (2009)

R. Rolinsky, L. Wu, **N. Van Goethem**, B. Delsaute, F. Bioul, N. Van den Bogaert, V. Regnier, F. Dupret, "Dynamic Simulation of Bulk Crystal Growth", Proc. 9th Scientific and Business Conference on Silicon Technology, Photovoltaic and Infrared Optics (SILICON 2004)", Roznov pod Radhostem, Czech Republic, November 2004, K. Vojtechovsky editor, pp. 231-234.

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Modeling in Crystal Growth, Hauppauge, New York, USA, 18-20 October 2000, pp. 9-10.

Posters (4)

N. Van Goethem, N. Van den Bogaer, A. de Potter, F. Dupret, "Dynamic prediction of defect formation in Czochralski silicon growth. Analysis of the discrepancy between experimental defect diffusion coefficients and the V/G criterion", 5th International Workshop on Modeling in Crystal Growth, Bamberg, Germany, September 2006 (Poster)

N. Van Goethem, N. Van den Bogaer, A. de Potter, F. Dupret, "Dynamic prediction of defect formation in Czochralski silicon growth", ISPN 2, Kaoshiung, Taiwan, October 2005 (Poster)

N. Van den Bogaert, R. Rolinsky, L. Wu, B. Delsaute, **N. Van Goethem**, V. Regnier, F. Dupret, "Global Dynamic Modeling of Czochralski Growth : Simulation of the Entire Growth Process Taking the Complex Geometrical Evolution of the System into Account", Proc. 13th Int. Conf. on Crystal Growth (ICCG-13), Kyoto, Japan, July-August 2001, (Poster 04a-K32-02, p. 498)

V. Regnier, L. Wu, R. Houtermans, B. Delsaute, **N. Van Goethem**, R. Rolinsky, N. Van den Bogaert, F. Dupret, "Numerical Modeling of Melt Convection in Czochralski Growth : From 2D to 3D Models; From Experiments to Simulations", Proc. 13th Int. Conf. on Crystal Growth (ICCG-13), Kyoto, Japan, July-August 2001, (Poster 04a-K32-03, p. 499).

7 Editorial board membership & Peer-reviewing

7.1 International Peer-reviewer

Structural and Multidisciplinary Optimization, Journal of Computational Physics, Interfaces and Free Boundaries, ISRN Math Analysis, Computer Methods in Engineering Science, IMA J. Appl. Math., Eng. Fract. Mech., Inv. Prob., Math. Meth. Mod. Appl. Sc., Math. Meth. Appl. Sc., SICON (SIAM), Proc. Roy. Soc. Ed. A, Appl. Anal., Numerical. Meth. PDEs, ESAIM: M2AN, ESAIM: COCV, DCDS-B, Math. Mech. Solids, IOP Journal of Physics: Conference Series, Journal of Elasticity, MDPI Mathematics, CAMWA, CMAME, ZAMM, Portugaliae Math., CalcVarPDE, Open Mathematics, Eng.Comput., Advances Calc. Var., Arch.Rat.Mech.Anal..

7.2 National Science Foundations & Projects Reviewing

German national science foundation (DFG: Deutsche Forschungsgemeinschaft)

Belgian national science foundation (FNRS: Fonds national de la recherche scientifique)

Romanian national science foundation

Qatar national science foundation

7.3 Referee for academic promotion

King Abdulaziz University (Saudi Arabia)

8 Pedagogical activity and training

8.1 Lecturing and teaching

Mathematics Department, University of Lisbon (in Portuguese)

- **Lecturing**

Calculus 3 (Undergraduate, 2023-, 5h weekly)

Calculus 2 (Undergraduate, 2021-, 5h weekly)

Integral e Measure theory (Undergraduate, 2025-, 3,5h weekly, Portuguese)

Differential geometry (Undergraduate, 2020-2024, 4,5h weekly, Portuguese)

Mathematical methods in Physics (Master, 2016-, 4h weekly, Portuguese and English)

Rational mechanics (Undergraduate, 2015-2018, 5h weekly, Portuguese)

- Teaching
 - Analysis 3 (Undergraduate, 2021-, 1h30 weekly, Portuguese)
 - Computational methods in Geology (Undergraduate, 2009-2012, 3h weekly, Portuguese.)
- Organization of the first Summer school for undergraduated students at FCUL (20-22 June 2018)
- Other:
 - PhD programme: Mathematical elasticity (2015, Italian and English)
 - Master seminar programme: The topological derivative concept in shape optimization

Ecole Polytechnique de Louvain (in French)

Exercices of Continuum mechanics (Undergraduate, 1999-2006)

Exercices of Calculus I (Undergraduate, 2000-2003)

Exercices of Numerical methods I (Undergraduate, 2001-2003)

Math. Dept. University College of London (in English)

Demonstrator in Calculus I & II (Undergraduate, 2003)

8.2 Original lecture notes

New courses: **Differential geometry**, **Mathematical methods in Physics** and **Rational mechanics**. The programme of the course has been completely revised and adapted. Original lecture notes have been written:

- (1) Mathematical methods in Physics
 - (1a) The Heat equation (course slides in Portuguese)
 - (1b) Continuum mechanics and thermodynamics (course slides in Portuguese)
 - (1c) Special relativity (in English)
- (2) Rational mechanics (course slides in Portuguese)
- (3) Exercices book in Continuum mechanics (UCLouvain, French, 2000-2006)
- (4) Differential geometry (theory and exercices)
- (5) Integral e  and Measure theory

8.3 Other pedagogical activity

Ecole Polytechnique de Louvain (2000-2002):

Participation in the launching of a new pedagogical project called CANDI2000 based on project-based learning at undergraduate level.

8.4 Scientific Supervision and training

- 2018: Internship in PDEs and Numerics: supervision of Bachar Salame and Jiaming Liu (Insa, Rouen, France)
- 9/2017-8/2018: Supervision of graduate student Pedro Campos (Gulbenkian foundation: "Novos talentos na Matem  tica"); Publication [43];
- 9/2017-8/2018: Post-doc Marco Caroccia (PhD Mathematics, Pisa University, Italy); Publication [4];
- 1/2017-6/2018: Post-doc Riccardo Scala (PhD Mathematics, SISSA, Italy)

- 2016-2018: Co-supervision of PhD student Marcel Xavier (LNCC, Brasil) with A. Novotny; Publication [7,10]. Title *Análise de Sensibilidade Topológica na Mecânica do Dano e da Fratura*.
- 2015: Internship in PDEs and Numerics: supervision of Julie Barniquel (Polytech, Clermond-Ferrand, France)
- 2012-2014: Co-supervision PhD Student Riccardo Scala (SISSA) with G. Dal Maso; Publications [3,5,6,14,17,18]. Title *A variational approach to statics and dynamics of elasto-plastic systems*.
- 2012-2013: Main supervision of Master thesis (Tesi di Laurea Magistrale) by G. Maggiani: *Polyconvexity and incompatibility for three dimensional elastic bodies and thin elastic structures* (Università degli Studi di Trieste, 2013); Publication [18];
- 2006: Master thesis (Mémoire de fin d'étude) by A. Robert: *Etude sur la dynamique des dislocations* (Université catholique de Louvain, 2007; co-supervision with F. Dupret).

8.5 Faculty/Department responsibilities

- Member of the strategic board of CEMS.UL since 2025
- Member of the executive board of CEMS.UL (2023-25)
- Vice- president of the Mathematics department, FCUL (12/2022 - 11/2023)
- Responsible for the Colóquios de Matemática (series of mathematical colloquia) at the Department since 2021
- Responsible for the CMAFcIO seminar in 2017-2020: Differential equations (weekly). Summary of the visitors and talks delivered at <http://cmafcio.campus.ciencias.ulisboa.pt/node/17>
2020-currently: Co-chair of the WADE (joint CMAFcIO-GFM-CAMGSD) online seminar series (<https://wade.ulisboa.pt/>)
- 2018: Responsible for the summer school programme of the mathematics department (<https://ciencias.ulisboa.pt/pt/escola-de-verão-de-matemática>).

8.6 Mobility programme

- 2018 ERASMUS University training programme with France (Rouen)
- 2015 University training programme with France (Clermond Ferrand)

9 Languages

French: mother tongue

English, Italian, Portuguese: very good knowledge

German: very good understanding

Dutch: good understanding

Chinese: basic notions (particular interest for the chinese ideograms)

10 Miscellaneous

Musical composition and organization of musical composition workshops. Tennis & hiking.