

# Nicolas Van Goethem

CMAFcIO

*Centro de Matemática, Aplicações Fundamentais  
e Investigação Operacional*

Faculdade de Ciências

Departamento de Matemática

Campo Grande, Edifício C6,

1749-016 Lisboa, Portugal

✉ vangoeth@fc.ul.pt

☎ +351930416751

Belgian

Born: 12 March 1976 in Sorengo (CH)

Married, 2 children

## 1 Scholarly indicators

### Database coordinates

Researcher ID (WoS): A-7674-2013

ORCID ID: 0000-0002-5356-8383

SCOPUS ID: 36509173100

MR Author ID number: 749820

(van goethem, n<sup>\*</sup> )

zbMATH: van-goethem.nicolas

### H-index

ISI (WoS)=10

Scopus=10

Google scholar=14

Researchgate=14

### Citations

Google scholar=653

Researchgate=530

ISI (WoS)=324

Scopus=340

## 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:

$\Gamma$ -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 Education

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

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

Undergraduate studies: European School of Varese (Italy) and Brussels (Belgium).

### 3.2 *Qualifying Examinations*

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" (qualified with unanimity.)

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

### 3.3 *Employment history*

Currently: Professor auxiliar at FCUL

In charge since 01.04.2008 at FCUL

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

CEEC2018 contract.

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

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

iFCT2013 contract.

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 contract

Jan. 2007- Feb. 2008: Post-doctoral training at the Ecole Polytechnique, Palaiseau, France

ER-Marie Curie post-doctoral fellow

*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*

### 3.4 *Competitions, Prizes & Grants*

2019: Selected for FCT CEEC2018 (sole 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:

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

### 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 (CFAMcIO 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-): works on "A fundamental approach to Entropy principles".

### 4.3 Conference & symposium organization

- Chair of a 8ECM minisymposium: "Nonlinear analysis for continuum mechanics", Portoroz, Slovenia, June 24-25, 2021
- Keynote lecture & minisymposium at Conference *Dynamics, Equations and Applications*, AGH University of Science and Technology (Kraków, Poland), September 16-20, 2019 (<https://www.dea.agh.edu.pl/>).
- 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>).
- 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 Recent written scientific production

### 5.1 Publications in international peer-reviewed journals (37)

3. 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*).
4. M. Carocchia, M. Focardi, **N. Van Goethem**, On integral representation of local energy functionals on  $BD$ , *SIAM J. Math. Anal.*, 52(4), 4022-4067. (*ISI IF=1.3; Scimago Q1; Scopus percentile: 85-Analysis*).

5. 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).
6. 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  
**2019**
7. 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).
8. R. Scala, **N. Van Goethem**, A variational approach to single crystals with dislocations, SIAM J. Math. Anal., 51 (1), 489-531, 2019 (ISI IF=1.65, Scimago & WoS Q1).
9. R. Scala, **N. Van Goethem**, Variational evolution of dislocations in single crystals, J. Nonlinear Sci., 29(1), 319-344, 2019. (ISI IF=1.90, Scimago & WoS Q1).  
**2018**
10. 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=2.58, Scimago & WoS Q1).

## 5.2 International conference proceedings (2)

11. 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., J. F. Rodrigues and M. Hintermüller eds., 2019. (Hal preprint: hal- 01789190).
12. 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

## 6 Pedagogical activity and training

### 6.1 Lecturing and teaching

#### Mathematics Department, University of Lisbon (in Portuguese)

- Lecturing

Differential geometry (Bachelor year 3, 2021-, 5h weekly, Portuguese)

Mathematical methods in Physics (Master, 2016-2018&2020-2021, 6h weekly, Portuguese and English.)

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

- Teaching

Computational methods in Geology (Undergraduate, 2009-2012, 3h weekly, Portuguese.)

## 7 Miscellaneous

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