

# Curriculum Vitae

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Born in Vosselare (Nevele), February 22, 1948

Married to SAP Chantal,  
Two children: Klaas (°1975) and Lien (°1977)

### EDUCATION

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- **1972:** Metallurgical Engineer, Katholieke Universiteit Leuven, with a thesis "Design of a laboratory project on powder metallurgy".
  - **1982:** PhD in Applied Sciences, K.U.Leuven, with a thesis on "The fatigue limit, the surface condition and the fatigue threshold of steel wire".
  - **1987:** Special PhD\*, K.U.Leuven, with a thesis on "The influence of the fibre-matrix interface on the hygrothermal behaviour of aramid-epoxy composites", and a public lecture on "The crack closure effect during fatigue loading of composite materials".
- (\* Special PhD: equivalent to a Habilitation in Germany)

### PROFESSIONAL AND EDUCATIONAL EXPERIENCE

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**1972-1976:** social worker at the University Parish, K.U.Leuven, mainly leading working groups on technology-society relationship.

**1976-1982:** research assistant at the Dept. of Metallurgy, K.U.Leuven, on a research project in cooperation with the Bekaert Co.

**1982-1987:** research associate of the Belgian National Fund for Scientific Research, and lecturer ("lector") at the Dept. of Metallurgy and Materials Engineering, K.U.Leuven

July '86 - January '87: visiting scholar at the Department of Aeronautical and Astronautical Engineering, Stanford University, California, USA (with prof. Springer, Structures and Composites Laboratory).

**1987-1990:** senior research associate of the Belgian Fund for Scientific research, and lecturer ("Buitengewoon docent") at K.U.Leuven, Dept. of Metallurgy and Materials Engineering.

- invited lecturer at the Université Catholique de Louvain, Louvain-la-Neuve

- invited lecturer at the Vrije Universiteit Brussel

- research affiliate at Stanford University, Department Aeronautics and Astronautics

**1990-.....:** full professor ("gewoon hoogleraar") at K.U.Leuven

**1992-.....:** professeur extraordinaire at U.C. Louvain

**2006-... :** Chairman of the Leuven Materials Research Centre (see [www.mtm.kuleuven.be/Research/MRC/](http://www.mtm.kuleuven.be/Research/MRC/))

# **RESEARCH**

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## **RESEARCH ACTIVITIES**

After my PhD on “Fatigue of steel wires” (1982), I initiated research on composites ( fibre reinforced polymers) at the Department of metallurgy and Materials Engineering at K.U.Leuven. Initially, research was focused on the mechanical behaviour of composites. Gradually, emphasis was put on textile reinforced composites, on advanced processing methods for composites and on sandwich materials. More recently, natural fibre composites and multiscale composites (containing nano- and meso-reinforcements) have been initiated.

As a full professor (since 1991) I am actually guiding, together with prof. Stepan Lomov, a group of 7 postdoc researchers, 15 PhD-students and 5 project researchers, and 15 Masters students, carrying out research in the areas of textile based composites, innovative sandwich materials, natural fibre composites and mechanical performance of composites. Research is now organised along four different research lines (see also [www.mtm.kuleuven.be/research/C2](http://www.mtm.kuleuven.be/research/C2)) :

### **COMPOSITES ON MACRO- AND MESO- LEVEL**

Composites are considered as one of the important examples of hierarchically organised structured materials. Apart from textile composites, random fibre composites and multilevel composites (nano-micro-meso-macro) also textiles, porous materials and biomaterials are being studied, both experimentally and by modeling.

Modeling studies concentrate on

- the internal material architecture and it’s visualization,
- flow through and deformation of these materials
- damage development.

Experimental studies deal with

- manufacturing (forming, deformability, impregnation, permeability)
- performance of the hierarchical materials (stiffness, strength, durability).

### **COMPOSITES ON MICRO- AND NANO- LEVEL**

Next level of improvement of composite properties requests “engineering” on micro-and nano-levels. The challenge of researchers in the CMG is to find innovative concepts to bring superior properties of nano-reinforcements from nano-level to macro-level. New research directions are dedicated to:

- Understanding behavior of nano-reinforcements, their synthesis and interactions with fibres;
- Characterizing dispersions;
- Creating hierarchical matrices with intelligent placement of nano-reinforcements;
- Developing modeling capabilities

### **NATURAL AND BIOCOMPOSITES**

Natural fibre and bio-based composites have many potential advantages like renewability, low energy utilisation, low carbon footprint, often low cost, health and safety benefits and specific technical features like acoustic damping and low CTE.

Research themes are:

- Mechanical performance of both natural fibres and composites
- Understanding and improving the fibre-matrix interfacial adhesion
- Selection and development of (bio) polymer matrices
- Development of novel fibre processing methods

### **PROCESSING & PRODUCT DEVELOPMENT**

The applicability of composite materials can be strongly enhanced by the concurrent development and optimisation of composite materials, products and their manufacturing processes.

In the process development, focus is on:

- Reactive thermoplastic resin transfer molding
- Novel resin system for RTM, casting, filament winding, compression molding
- Optimization of RTM and RTM-light processes

Projects in product development encompass:

- Design and evaluation of light-weight structural elements
- Fiber reinforced shape memory polymers
- Improvement of the crash behavior of helmets by means of anisotropic foams

## **PUBLICATIONS :**

- about 135 publications in reviewed journals and 340 in conference proceedings, editor of 3 books, holding 10 patents, ... *(more details in separate document)*

## **PHD THESISSES**

- promotor of 30 doctorates *(see attached list)*, 16 doctorates in preparation

## **RESEARCH PROJECTS**

### **K.U.Leuven-Research Council**

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- several (junior and senior) research fellowships
- several long term projects ( 3OT's, 1 GOA) *(more details in available on request)*

### **NFWO, IWT, DPWB ..... (national funding agencies)**

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- 22 IWT-projects (of which longterm, fundamental projects; others are 2-4 year projects in collaboration with industry), *(more details in available on request)*
- 5 FWO-projects, several FWO-fellowships , *(more details in available on request)*

### **European Community, ESA ....**

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- 24 EU-financed research projects *(more details in available on request)*

## **TEACHING ACTIVITIES**

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### **at K.U.Leuven**

#### ***Undergraduate programmes***

– *general materials courses:*

- engineering, 1<sup>st</sup> bachelor.: "introduction to materials engineering" (taught since 1985, as course title-holder since 1987)
- 1st year architectural engineer: "metallic materials" (taught since 1981, as course title-holder since 1987 till 1998)

– *specific composites courses:*

- "composite materials" (taught since 1986 as optional course, course title-holder since 1988, now in 3<sup>rd</sup> bachelor for )
- capita selecta "mechanical materials engineering" (optional course, since 1991), later on transformed into "Polymer Composites II"

#### ***Post-graduate courses***

- responsible for bi-annual "Composite Materials Workshop" (1984, 1986, 1988, 1990)
- responsible for the preparation (1990-1991) and coordination (since 1991) of a Masters Programme "Polymer and Composites Engineering", EUPOCO, in the framework of the ERASMUS-cooperation with UCL, RWTH-Aachen, TU-Delft, Ecole des Mines (Paris) and Imperial College (London); this programme started in 1991-1992, and has had during ten

academic years a total of about 150 master students and 75 modular students. Since the academic year 2001-2002, the EUPOCO-program became an option in the “Master in Materials Engineering” program, which also has an option “Metals and Ceramics” and an option “Materials for Micro-electronics”

#### **At other universities**

- UCL: "chargé de cours invité" (from 1987) and consequently “professeur extraordinaire” (from 1992) for the course "Matériaux Composites" (co-course title holder with prof. Legras)
- VUB and RUG: visiting professor in the framework of the Interuniversity programme "Aviation and Space Travel Techniques" teaching the course "Aerospace materials" (from 1987); since 2000, joint program K.U.Leuven – V.U.Brussel, as an option in the mechanical engineering degree..

## **PROFESSIONAL ACTIVITIES**

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- **ICCM** (International Conference on Composite Materials):
  - member of the Executive Council, since 1991.
  - Vice-president since 1999, Senior Vice-Presidency since 2001, **president 2003-2005**
- **ESCM** (European Society of Composite Materials):
  - member of the Standing Committee (1995-1997) of EACM (European Association of Composite Materials),
  - President of the Provisional Council (1997-1998)
  - first **President** of the Society (1998-2000)
- **member of several professional societies:**
  - Royal Flemish Society of Engineers (member of the working group on aero- and aeronautical engineering)
    - SAMPE (Society for the Advancement of Materials and Process Engineering)
    - SME (Society of Manufacturing Engineers)
    - SPE (Society of Plastics Engineers)
- member of the commission “Materials and chemical engineering” of the National Fund for Scientific Research-Flanders (since 1996, president since 2001 till 2006)
- member of several expert committees at the European Commission (DGXII) and IWT (Flemish Institute for Science and Technology)
- member of several evaluation committees of composites related research institutes (e.g. of the “Institut für Verbundwerkstoffe” of the Universität Kaiserslautern, of the materials research at the Central research Labs of Daimler-Chrysler (1998), ...)

## **EDITORIAL ACTIVITIES**

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- member of the editorial board of the "Composites A" ( 1992-...)
- member of the editorial board of "Composites Science and Technology" (1992-1998)
- member of the Editorial Board of “Journal of Reinforced Plastics and Composites” (1998- )

## CONFERENCES / WORKSHOPS : CHAIRMAN, MEMBER OF ORGANISING COMMITTEES, SCIENTIFIC COMMITTEES

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- founder and co-chairman of **TEXCOMP** (int. Conference on Textile Composites): Texcomp-1 (Leuven, 1992), Texcomp-2 (Leuven, 1994), Texcomp-3 (Aachen, 1996), Texcomp-4 (Kyoto, 1998), Texcomp-5 (Leuven, 2000)
- Member of the scientific committee of **ICCM-6** (London, 1987), **ICCM-7** (Beijing, 1989), **ICCM-8** (Honolulu, 1991), vice-chairman), **ICCM-9** (Madrid, 1993), vice-chairman), **ICCM-10** (, 1995, Vancouver, Int. Advisory Comm.), **ICCM-12** (1999, Paris, member Exec.Cmm.), **ICCM-13** (2001, Beijing), **ICCM-14** (2003, San Diego), **ICCM-15** (2005, Durban), **ICCM-16** (Kyoto, 2007)
- member of the Scientific or Executive Committee of **EECM-2** (London, 1987), **ECCM-3** (Bordeaux, 1989), **ECCM-4** (Stuttgart, 1991), **ECCM-5** (Bordeaux, 1993), **ECCM-7** (London, 1996), **ECCM-8** (Naples, 1998), **ECCM-10** (Brugge, 2002, Vice-Chairman), **ECCM-11** (Rhodos, 2004), **ECCM-12** (2006, Biarritz), **ECCM-13** (2008, Stockholm)
- member of the international advisory committee of **ICPM '89** (Interfacial phenomena in composite materials, Sheffield 1989), chairman of **ICPM '91** (Leuven, 1991), member of Int. Scientific Committee **ICPM'93** (Sheffield, 1993), **ICPM-95** (Eindhoven, 1995), **ICPM'97** (Eger, Hungary, 1997), **ICPM'99** (Berlin, 1999)
- member of the organising committee of the International Colloquium on "Durability of polymer based systems for structural applications", (Brussels, 1990, 1995, 1998, Tokyo 2001)
- member of the Scientific Committee of the yearly European **SAMPE** Conferences ( since 1992)
- organiser and chairman of the Stanford-K.U.Leuven symposium on "Current advances in design manufacturing and performance of composite materials" (Leuven, 1989)
- member of the international committee of the "3rd International Conference on Biaxial/Multi-axial Fatigue" (Stuttgart, 1989)
- organiser and chairman of the International Colloquium on "Damage development in Composites" (Leuven, May 1987)
- organiser and chairman of several Composite Materials Workshops at K.U.Leuven (1984-1988)
- member of the Scientific or International Advisory Committee of numerous other international conferences : "Deformation and Fracture of Composites", "ISATA", **ICCI** (Int. Conference on Composite Interfaces), ...
- *etc. ...many more smaller and thematic conferences...*

## HONORS, AWARDS

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- Award of the Belgian Ministry of Education for Ph.D.thesis (jan. 1984) (in Dutch: *Laureaat van de Reisbeurzenwedstrijd*)
- Gold Composite Medal of the Composite Materials Committee, German Society of Metallurgists (*Fachausschuss Verbundwerkstoffe der Deutschen Gesellschaft für Metallkunde*) for "presentation of an outstanding research work on Composites"(as co-author) in Konstanz, May 1984.
- Laureate of the Belgian Academy of Science, Literature and Arts (award for Ph.D. thesis)(dec. 1984)(in dutch: *Laureaat van de Klasse der Wetenschappen van de Koninklijke Akademie van Wetenschappen, Letteren en Schone Kunsten van België*).
- "Award for Outstanding Presentation of a Research Paper" at the 6th International Conference on Fracture", New Delhi, India (dec. 1984)
- "Innovation Award 1991" of *Techtex* ("Bianual Symposium and Exhibition for Technical Textiles" in Frankfurt) for the development (together with the company *Parabeam*) of "2.5D-fabrics" for composite reinforcement.
- "Special Education Award" of **SAMPE** 'Society for the Advancement of Materials and Process Engineering), received during the European **SAMPE**-meeting in Hamburg (May 1992) for "the development of European wide educational activities in composite materials".

- JEC-Special Award 2003 for the “Composites-on-Tour” project (Paris, april 2003)
- Descartes Prize for Science Communication (European Commission), awarded in Prague, 2 december 2004, for the initiation and leading of the Composites-on-Tour project.
- Francqui-Chair at the Université Catholique de Louvain (2008)
- “International Fellow” of the Society for the Advancement of Materials Processing and Engineering (SAMPE, 2009)
- “Fellow and Life-long member” of the International Committee on Composite Materials (ICCM, 2009).

## **LONGER RESEARCH VISITS...**

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- august 1986 – march 1987: visiting researcher at Stanford University, Department of Aeronautical and Astronautical Engineering
- october 1999: visting professor at Kansai University and Kyoto Institute of Technology (Japan)
- augustus-september en november-december 1999: visiting professor at EPFL (Ecole Polytechnique Fédérale de Lausanne), Zwitserland