

## Julien YVONNET

Birth date: July 18, 1978

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## RESEARCH INTERESTS

Numerical modeling of complex materials, computational homogenization, multiscale methods for solid materials, fracture and interface modeling, nanomechanics, forming processes simulation, numerical methods.

## EDUCATION

2009	Habilitation à Diriger des Recherches <sup>1</sup> (H.D.R)	Mechanics	University Paris-Est, France
2004	Ph.D. thesis	<b>Mechanical Engineering</b>	<b>ENSAM<sup>2</sup> Paris, France</b>
2002	M.S.	Mechanical Engineering	ENSAM Paris, France
2001	Agregation <sup>3</sup>	Mechanical Engineering	Ecole Normale Supérieure, Cachan, France
2000	B.S. (eq.)	Mechanics and technologies	Ecole Normale Supérieure, Cachan - University Paris VI, France

## ACADEMIC EXPERIENCE

2020-	Deputy head of the Multiscale Modelling and Simulation Laboratory (MSME), Université Gustave Eiffel, France
2014-2019	Head of the Mechanical Group of the Multiscale Modelling and Simulation Laboratory (MSME), Université Paris-Est Marne-la-Vallée, France

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<sup>1</sup> H.D.R. is the highest academic qualification in France, mandatory to be an independent PhD advisor and to reach full professorship.

<sup>2</sup> Ecole Nationale Supérieure des Arts et Métiers.

<sup>3</sup> Agregation is a French national competition for positions in the public education system.

2010-	<b>Full Professor</b> , Université Paris-Est Marne-la-Vallée, France
2005-2010	<b>Associate professor</b> , Université Paris-Est Marne-la-Vallée, France
2003-2005	Temporary professor, ENSAM Paris, France
2002-2003	Temporary lecturer, ENSAM Paris, France Temporary lecturer, Université Marne-la-Vallée, France

## HONORS AND AWARDS

- IACM 2018 John Argyris Award for young scientists (The International Association for Computational Mechanics)
- ECCOMAS 2014 O.C. Zienkiewicz award (The European Community on Computational Methods in Applied Sciences)
- Fellow of the French University Institute (Institut Universitaire de France, IUF), Junior member, associated with a 5-years research grant) (2013)

## AWARDS OBTAINED BY PhD STUDENTS

- S. Nezamabadi, Best PhD award from the French Association of Computational Mechanics (CSMA), 2009
- T.T. Nguyen, Best PhD award from the French Association of Computational Mechanics (CSMA), 2015
- D. Da, Melosh Competition finalist for best PhD award, 2019

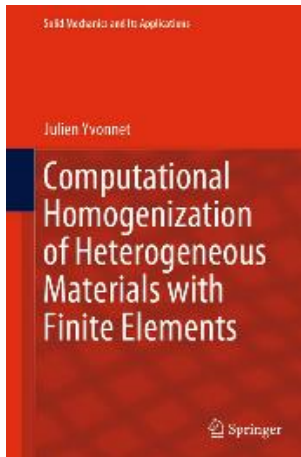
## SUMMARY OF SCIENTIFIC ACTIVITIES

- **112** articles in peer-reviewed journals including: Computer Methods in Applied Mechanics, International Journal for Numerical Methods in Engineering, Journal of the Mechanics and Physics of Solids, Journal of Applied Physics, Nanotechnology, Composite Science and Technology, Journal of Computational Physics, International Journal of Solids and Structures, Mechanics of Materials, MRS Bulletin, Journal of Applied Mechanics, etc. (see the complete list of publications).
- Citations (January 2025)  
Isi Web of Science: **4388**, h-index = **37**  
Google Citations: **6923**, h-index = **45**
- **1** Monograph
- **9** book chapters
- **159** communications in national and international conferences
- **4** plenary conferences in an international conference
- **2** semi-plenary conference in an international conference
- **29** keynotes and invited lectures in international conferences
- **49** invited lectures in seminars of international or national (French) Universities and in national thematic workshops
- Involved in the organization of **30** international conferences and local scientific events
- Member of the editorial board of **9** international journals
- **14** visiting positions (China, Singapore, USA, Spain, Greece)

- **20** funded contracts as PI or co –PI.
- **28** advised PhD theses including **24** defended, **8** post-doctoral fellows and **18** master students advised

## MONOGRAPH

[1] J. Yvonnet, **Computational Homogenization of Heterogeneous Materials with Finite Elements**, Springer, 2019 ISBN: 978-3-030-18382-0.



## CURRENT RESEARCH ACTIVITIES

My current activities deal with **multiscale modelling of solid materials**, including linear and nonlinear, multi-physics behaviors, with gradient effects, using computational approaches. The methods involve in particular the **modelling of cracks in heterogeneous materials** and their effect on the effective behavior of the material. Applications are related to civil engineering materials, composites and energy harvesting systems.

## RESEARCH ACHIEVEMENTS

A first major achievement is the development of **numerical multiscale (homogenization) methods** to study **nonlinear, multiphysics and time-dependent heterogeneous materials**. Over the last years, I have introduced several innovative strategies to make these approaches computationally tractable using **model reduction** and **Data-driven/Artificial Intelligence tools** (neural networks, unsupervised machine learning, clustering). Another strong achievement is the development of fracture simulation in complex microstructures of materials. My group has pioneered the use of the phase field method to **fracture** in experimental, realistic, **image-based models of materials**. I have developed many modelling and computational extensions of these fracture simulation methods for different classes of applications including civil engineering, composites or 3D printed materials, taking into account interface fracture, stochastic microstructures and process-induced fracture anisotropy as found in 3D printed parts. Finally, I have also conducted with my group pioneering works on the design of fracture-resistant materials by **combining topology optimization and fracture simulation** methods in heterogeneous materials. Other very recent and promising developments include innovative methods based on harmonic approaches to construct **multiscale models of mechanical damage**. These scientific advanced have been conducted both through academic and aerospace/naval industry/energy industrial collaborations (Safran, EDF, CEA, ONERA, Naval Group, WeAre Aerospace).

## PAPERS IN REFERRED JOURNALS

- [112] X. Chen, J. Yvonnet, S. Yao, J. Hu, Y. Huang, Strong C1-coupling Multi-Patch Isogeometric Topology Optimization of Complex Structures for Strain Gradient Problems, **International Journal of Solids and Structures**, 2025, accepted.
- [111] Z. Chafia, J. Yvonnet, J. Bleyer, A Data-Driven-based homogenization method to simulate the anisotropic damage of quasi-brittle heterogeneous structures, **Computer Methods in Applied Mechanics and Engineering**, 437: 117747, 2025.
- [110] A. Ketata, J. Yvonnet, N. Feld, F. Detrez, A. Parret-Freud, Structural zoom for linear composite materials based on adaptive mesh and homogenization, **Meccanica**, January 2025, accepted.
- [109] Z. Chafia, J. Yvonnet, J. Bleyer, S. Vincent, S. El Ouafa, Massively parallel phase-field fracture simulations on supercomputers: towards multi-billion Degree-of-freedom computations, **Advanced Modelling and Simulation in Engineering Sciences**, November 2024, accepted.
- [108] S. Chaouch, J. Yvonnet, Unsupervised machine learning classification for accelerating FE2 multiscale fracture simulations, **Computer Methods in Applied Mechanics and Engineering**, 432: 117278, 2024.
- [107] X. Chen, S. Yao, J. Yvonnet, Nonlinear topology optimization of flexoelectric soft dielectrics at large deformation, **Computer Methods in Applied Mechanics and Engineering**, 427: 117005, 2024.
- [106] X. Chen, S. Yao, J. Yvonnet, Multiscale topology optimization of an electromechanical dynamic energy harvester made of non-piezoelectric material, **Structural and Multidisciplinary Optimization**, 67:66, 2024.
- [105] P. Li, Y. Wu, J. Yvonnet, S. Liu, S. Gu, Phase field modeling of dynamic fracture in elastoplastic composites taking into account interfacial debonding, **Engineering Fracture Mechanics**, 295: 109792 2024.
- [104] S. Chaouch, J. Yvonnet, An unsupervised machine learning approach to reduce nonlinear FE2 multiscale calculations using macro clustering, **Finite Element in Analysis and Design**, 229: 104069, 2024.
- [103] J. Yvonnet, D. Da, Topology optimization to fracture resistance: a review and recent developments, **Archives of Computational Methods in Engineering**, accepted, 2023.
- [102] P. Kumar, A.V. Kumara, P. Li, J. Reinosob, Q.-C. He, J. Yvonnet, M. Paggi, SIMP Phase-field topology optimisation framework to maximise fracture resistance in FGMs, **Composite Structures**, Accepted, 2023.
- [101] J. Yvonnet, Q.-C. He, P. Li, Reducing internal variables and improving efficiency in data-driven modelling of anisotropic damage from RVE simulations, **Computational Mechanics**, 72: 37–55, 2023.
- [100] X. Chen, S. Yao, J. Yvonnet, Dynamic analysis of flexoelectric systems in the frequency domain with Isogeometric Analysis, **Computational Mechanics**, 71: 353–366, 2023. [99] Y. Wu, J. Yvonnet, P. Li, Topology optimization for enhanced dynamic fracture resistance of Structures, **Computer Methods in Applied Mechanics and Engineering**, 394:114846, 2022.
- [98] J. Yvonnet, Q.-C. He, P. Li, A data-driven harmonic approach to constructing anisotropic damage models with a minimum number of internal variables, **Journal of the Mechanics and Physics of Solids**, 162:104828, 2022.
- [97] P. Li, J. Yvonnet, Y. Wu, Improved fracture resistance of 3D-printed elastoplastic structures with respect to their topology and orientation of deposited layers, **International Journal of Mechanical Sciences**, 220: 107147, 2022.
- [96] M.A. Benaimeche, J. Yvonnet, B. Bary, Q.-C. He, A k-means clustering machine learning-based nonlinear multiscale method for anelastic heterogeneous structures with internal variables, **International Journal for Numerical Methods in Engineering**, 123:2012–2041, 2022.
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- [93] X. Lu, F. Detrez, J. Yvonnet, J. Bai, Identification of elastic properties of interphase and interface In graphene-polymer nanocomposites by atomistic simulations, **Composites Science and Technology**, 213(8):108943, 2021.
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- [A91] X. Lu, J. Yvonnet, L. Papadopoulos, I. Kalogeris, V. Papadopoulos, A stochastic FE2 data-driven method for nonlinear multiscale modeling, **Materials**, 14(11): 2875, 2021.
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- [A89] X. Chen, J. Yvonnet, S. Yao, H.S. Park, Topology optimization of flexoelectric composites using homogenization, **Computer Methods in Applied Mechanics and Engineering**, 381, 113819, 2021.
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- microstructures obtained by microtomography, **Computer Methods in Applied Mechanics and Engineering**, 312:567-595, 2016.
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- [A11] Illoul L.A., Yvonnet J., Chinesta F., Clenet S., Application of the natural element method to model moving electromagnetic devices, **IEEE Transactions on Magnetics**, 42(4) 727-730 (2006).
- [A10] Yvonnet J., Villon P., Chinesta F., Natural Element approximations involving bubbles for treating incompressible media, **International Journal for Numerical Methods in Engineering**, 66(7), 1125—1152 (2006)
- [A9] Yvonnet J., Umbrello D., Chinesta F., Micari F., A simple inverse procedure to determine heat flux on the tool in orthogonal cutting, **International Journal of Machining tools and manufacturing**, 46(7-8):820-827 (2006)
- [A8] Lorong Ph., Yvonnet J., Coffignal G., Assouline S., Contribution of structural analysis in numerical simulation of machining and blanking : state-of-the-art, **Archives of Computational Methods in Engineering**, 13(1), 45—90. (2006)
- [A7] Alfaro I., Yvonnet J., Cueto E., Chinesta F., Villon P., Doblaré M., Nouvelles avancées dans les méthodes sans maillage de type éléments naturels pour la simulation des procédés de mise en forme.

**Revue Européenne de Mécanique Numérique** (anciennement Revue Européenne des Eléments Finis) (200) ; 15(1-2-3) :29-45.

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[A4] Sukumar N., Dolbow J., Devan A., Yvonnet J., Chinesta F., Ryckelynck D., Lorong P., Alfaro I., Martinez M.A., Cueto E., Doblare M.. Meshless methods and partition of unity finite elements, **International Journal of forming processes**, 8 (4), 409-427 (2005).

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## **BOOK CHAPTERS**

[B9] X. Lu, J. Yvonnet, F. Detrez, J. Bai, Modélisation électromécanique non linéaire multi-échelle de nanocomposites graphène-polymère, In: Nanocomposites, préparation, caractérisation et modélisation, J. Bai (Ed), ISTE-Wiley, 2021.

[B8] T.T. Nguyen, J. Yvonnet, M. Bornert, C. Château, Modeling of Complex Microcracking in Quasi-Brittle Materials: Numerical Methods and Experimental Validations, In: Advances in Multi-Physics and Multi-Scale Couplings in Geo-Environmental Mechanics, F. Nicot, O. Millet (Eds), Wiley, 2017.

[B7] M.G.D. Geers, V. Kouznetsova, K. Matous, J. Yvonnet, Homogenization methods and multiscale modeling: non-linear problems, In: Encyclopedia of Computational Mechanics, E. Stein, R. de Borst, T.J.R. Hughes (eds.), Wiley, 2016.

[B6] Yvonnet J., He Q.-C., Monteiro E., Tran A.B., Toulemonde C., Sanahuja C., Clément A., Soize C., Non-concurrent computational homogenization of nonlinear, stochastic and viscoelastic materials, dans Handbook of Micromechanics and Nanomechanics, S. Li and X.-L Gao (eds.), Pan Stanford, 2013.

[B5] Chinesta F., Yvonnet, J., Villon P., Breitkopf P., Joyot P., Alfaro I., Cueto E., New Advances in meshless methods : Coupling natural element and moving least square techniques, dans Advances in Meshfree Techniques, Computational Methods in Applied Sciences, 5, 97-121, V.M.A. Leitao, C.J.S. Alves, Duarte C., eds., 2007.

[B4] Chinesta F., Yvonnet J., Villon P., Breitkopf P., Joyot P., Alfaro I., Cueto E., Nouvelles avancées dans les méthodes sans maillage : le couplage des techniques éléments naturels et moindres carrés mobiles dans Modélisation Numérique – Défis et Perspectives, P. Breitkopf, C. Knopf-Lenoir, Hermès Science, 2007.

[B3] Yvonnet J., Villon P., Chinesta F., Natural element approximations involving bubbles for treating incompressible media, ??, dans Lecture Notes in Computational Science and Engineering. Meshfree

Methods for Partial Differential Equations III, 54, Michael Griebel and Marc A. Schweitzer, Springer Verlag, 2007.

[B2] Yvonnet J., Lorong P., Ryckelynck D., Chinesta F., Coffignal G., Nouvelles avancées dans les méthodes sans maillage basées sur les éléments naturels contraints pour la simulation des procédés, dans Extensions et Alternatives à la Méthode des Eléments Finis, Piotr Breitkopf, Hermès Science, 2006.

[B1] Yvonnet J., Ryckelynck D., Lorong P., Chinesta F., Treating moving interfaces in thermal models with the C-NEM, 255 – 270, dans Lecture Notes in Computational Science and Engineering. Meshfree Methods for Partial Differential Equations II, Michael Griebel and Marc A. Schweitzer, Springer Verlag 2005.

## **PROFESSIONAL SERVICE ACTIVITIES**

[3] 2024 – President of CSMA (French Computational Structural Mechanics Association)

[2] 2017- Elected member of the administrative board of CSMA (French Computational Structural Mechanics Association)

[1] 2017 – Member of the General Council of IACM (International Association for Computational Mechanics)

## **INVITED LECTURES IN INTERNATIONAL CONFERENCES**

### **Plenary lectures**

[4] J. Yvonnet, ECCOMAS Reduced order models for fracture and path-dependent multiscale simulations: Macro Clustering and data-driven approaches, 6th International Workshop on Model reduction Techniques (MORTECH), Paris Saclay, 22-24 November 2023, France.

[3] J. Yvonnet, Microfissuration des matériaux hétérogènes, 15e colloque national en calcul des structures, Giens, France , May 16-22, 2022

[2] J. Yvonnet, Microcracking in heterogeneous materials, 8th international conference on "Advanced COmputational Methods in Engineering (ACOMEN)" Liège, Belgium, August 31- September 2, 2022.

[1] Numerical modeling of fracture in highly heterogeneous materials, XXXIX Ibero-Latin American Congress on Computational Methods in Engineering (CILAMCE 2018), Compiègne, France, 11-14 November 2018.

### **Semi-plenary lecture**

[1] Computational homogenization of micro and nano-structured materials, 11<sup>th</sup> World Congress on Computational Mechanics, Barcelona, 20-25 July, 2014.

### **Keynote lectures**

[10] J. Yvonnet, D.Da, L. Xia, G. Li, Topology optimization for maximizing the fracture resistance of quasi-brittle composites, 6th European Conference on Computational Mechanics (ECCM6), Glasgow, UK, 11-15 June 2018

- [9] (Keynote lecture) J. Yvonnet, L. Xia, S. Ghabezloo, Phase Field Modeling of Hydraulic Fracturing with Interfacial Damage in Highly Heterogeneous Fluid-Saturated Porous Media, 14th US National Congress on Computational Mechanics, Montreal, Canada, July 17-20, 2017.
- [8] (Keynote lecture) J. Yvonnet, T.T. Nguyen, M. Bornert, C. Chateau, L. Xia, Modelling of microcracking in image-based models of highly heterogeneous materials using the phase field method, 7th GACM Colloquium on Computational Mechanics, Stuttgart, Germany, 11-13 October, 2017.
- [7] (Keynote Lecture) J. Yvonnet, T.T. Nguyen, M. Bornert, C. Chateau, Q.Z. Zhu, “Phase field modeling of complex matrix/interfacial crack propagation in complex microstructures obtained from microtomography images”, ECCOMAS Congress 2016, Crete Island, Greece, 5-10 June 2016.
- [6] (Keynote lecture) J. Yvonnet, B.A. Le, Q.-C. He, Neural networks for computational homogenization and optimization of hyperelastic heterogeneous materials, 13th US National Congress on Computational Methods (USNCCM 13), San Diego, USA, 26-30 July, 2015.
- [5] (Keynote lecture) J. Yvonnet, Coarse-graining homogenization of heterogeneous media with non-separated scales, 11th World Congress on Computational Mechanics, Barcelona, 20-25 July, 2014.
- [4] (Keynote lecture) M. T. Hoang, J. Yvonnet, G. Chambaud, A. Mitrushchenkov, Multiscale modeling of piezoelectric nanowires with surface effects based on ab initio calculations, 5th Asia Pacific Congress on Computational Mechanics and 4th International Symposium on Computational Mechanics, Singapore, December 11-14, 2013.
- [3] (Keynote lecture) J. Yvonnet, T.T. Nguyen, V. Monchiet, Q.-Z. Zhu, A Fourier-free approach to solve linear and nonlinear microstructural problems defined over large grids of voxels, 12th US National Congress in Computational Mechanics (USNCCM12), Raleigh, USA, July 22-25, 2013.
- [2] (Keynote lecture), Yvonnet J. Non-concurrent multiscale methods: a new trend for computational homogenization of nonlinear materials, 2nd International Workshops on Advances in Computational Mechanics, March 29-31, 2010, Yokohama, Japan
- [1] (Keynote lecture) Yvonnet J., Lorong P., Ryckelynck D., Chinesta F. Investigations in shear band propagation using a natural neighbor meshfree approach, 7th. ESAFORM Conference on Material Forming, Trondheim, Norway, avril 2004.

### **Invited lectures**

- [19] (Invited lecture) J. Yvonnet, Q.-C. He, P. Li, Data-driven harmonic analysis Damage modeling (DDHAD) for multi-scale modelling of anisotropic damage, Seventh International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2023), Prague, Czechia, 21-23 June, 2023.
- [18] (Invited lecture) J. Yvonnet, Unsupervised machine learning based on clustering for accelerating nonlinear multiscale simulations with internal variables, 14th International Symposium on Continuum Models and Discrete Systems, Paris, France – 26-30 June 2023.
- [17] (invited lecture) J. Yvonnet, Q.-C. He, P. Li, Data-driven harmonic analysis for multi-scale construction of arbitrary anisotropic damage models with minimal number of internal variables, IUTAM Symposium on Data-Driven Mechanics, Paris, October 26-28, 2022.
- [16] (Invited lecture) J. Yvonnet, T.T. Nguyen, M. Bornert, C. Chateau, Fissuration dans les microstructures de matériaux cimentaires : outils de simulation par la méthode de champ de phase,

Colloque national MECAMAT Aussois « Matériaux Numériques », Aussois, France, 22-27 janvier 2018.

[15] (invited lecture) J. Yvonnet, T.T. Nguyen, L. Xia, M. Bornert, C. Chateau, Q.Z. Zhu, Modeling interactions between bulk and interfacial cracking in concrete microstructures with the phase field method, 3e journées Matériaux Numériques, Tours, France, 31 janvier-2 février 2017.

[14] (invited lecture) J. Yvonnet, Modeling interactions between bulk and interfacial cracking in concrete microstructures with the phase field method, Workshop "Regularized models of brittle fracture", Paris, France, 2 May 2016.

[13] (Invited lecture) J. Julien Yvonnet, A. Tognevi, Guy Bonnet, M. Guerich, A filter-based computational homogenization method for problems with arbitrary scale separation, Workshop on Computational Mechanics of Generalized Continua and Applications to Materials with Microstructure, Catania, Italy, 29-31 October, 2015.

[12] (invited lecture) J. Yvonnet, A. Tognevi, G. Bonnet, M. Guerich, Filter-based computational homogenization, 1st Pan-American congress on computational mechanics, Buenos Aires, Argentina, 27-29 April, 2015.

[11] (Invited lecture) J. Yvonnet, G. Bonnet, «Coarse-graining/nonlocal homogenization of heterogeneous materials with arbitrary scale separation: a consistent scheme based on filters», IUTAM Symposium on Connecting Multiscale Mechanics to Complex Material, Evanston, Illinois, USA, May 14-16, 2014.

[10] (Invited lecture) J. Yvonnet, T.T. Nguyen, V. Monchiet, Q.-Z. Zhu, A fast method for solving microstructures problems with arbitrary contrasts defined on large grids of voxels without Fourier transform, ECCOMAS Coupled Problems in Sciences and Engineering (COUPLED 2013), Ibiza, Spain, June 17-19, 2013.

[9][INV11] (Invited lecture) J. Yvonnet, Q.-Z. Zhu V. Monchiet, A Lippmann-Schwinger method without Fourier transform to solve thermomechanical problems over voxels grids, ECCOMAS 2012, Vienna, Austria, September 10-14, 2012.

[8][INV10] (Invited lecture) J. Yvonnet, Q.-C. He, Q.-Z. Zhu, E. Monteiro, H. Le Quang, J.-F. Shao, S.-T. Gu, A XFEM framework for modeling heterogeneous media with interfacial energy and size-dependent properties, 10th World Congress on Computational Mechanics (WCCM 2012), São Paulo, Brazil, July 8-13, 2012.

[7] (Invited lecture) J. Yvonnet, M. Tuan Hoang, A. Mirtushchenkov, G. Chambaud, Multiscale modeling of piezoelectric nanowires, Fifth US-France symposia of the International Center for Applied Computational Mechanics (ICACM 2012), New-York, USA, June 11-13, 2012.

[6] (Invited lecture) J. Yvonnet, Alexander Mitrushchenkov, Qi-Chang He, Gilberte Chambaud, A multiscale procedure combining finite elements and ab initio calculations to model size-dependent mechanical properties of nanowires, 2nd International conference on Material Modeling (ICMM2), August 31st - September 2nd 2011, Paris

[5] (Invited lecture) Yvonnet J., Mitrushchenkov S., Chambaud G. A computational method for modelling size and surface effects in crystalline nanowires based on Finite Elements and Quantum

mechanics, 16th US National Congress of Theoretical and Applied Mechanics, June 27-July 2, 2010, State College, USA.

[4] (Invited lecture) Yvonnet J., He Q.-C., Numerical homogenization of nonlinear media at finite strains using numerically explicit potentials, 10th US National Congress on Computational Mechanics (UNSCCM), 16-19 July, 2009, Columbus, USA.

[3] (Invited lecture) Yvonnet J., Gonzalez D., He Q.-C., A method using numerically explicit potentials for the homogenization of arbitrarily nonlinear anisotropic composites, ECCOMAS Thematic conference: Computational Methods for Coupled Problems in Science and Engineering (COUPLED), 8-10 June 2009, Ischia Island, Italy.

[2] (Invited lecture) Yvonnet J., He Q.-C., Monteiro E. On the use of model reduction for computational homogenization of non-linear micro and nano composites, Computational Modeling and Experiments of the Composites Materials with Micro and Nano Structures – CMNS 2007, Liptovský Mikuláš, Slovakia, may, 28-31, 2007.

[1] (Invited lecture) Yvonnet J., He Q.-C., Zahrouni H., Potier-Ferry M. The reduced model multiscale method for the nonlinear homogenization of hyperelastic media, IInd ECCOMAS international conference on Computational Methods for coupled problems in Science and Engineering – COUPLED PROBLEMS 2007, Ibiza, Spain, may, 21-23, 2007

## **CONTRACTS AND GRANTS (funded)**

### As PI or co-PI :

[20] **PI** – Safran Aircraft Engines, ONERA, PhD contract (2023-2026) Arthur MONTAZEL PhD thesis, « Progressive damage in woven composites » : 60 k€

[19] **PI** – ALTAIR, « Multi-scale modeling of compressive damage in 3D printed architected lattices» : 10 k€

[18] **PI** – SAFRAN, PhD thesis Ali KETATA, « Adaptive and controlled multi-scale analysis of industrial structures» : 60 k€

[17] **PI**– CEA/Orano, Post-doc Amine Benaïmeche «Modeling and simulation of the mechanical effects of internal expansion due to corrosion of metal inclusions in cementitious matrices» : 15k€ (co-auteurs, Qi-Chang He, Benoit Bary)

[16] **PI** – Bosch Research Foundation (2021-2023) Thesis Hamid Reza Madadi « Artificial Intelligence and Computational Material Science – AI Based Two Scale Homogenization» : 186k€

[15] **PI** – CEA/Orano, research contract (2020-2021) Thèse Amine Benaïmeche « modeling and simulation of mechanical swelling effects due to corrosion of metallic inclusions in cementitious matrices » : 18k€ (co-auteurs, Qi-Chang He, Benoit Bary)

[14] **PI** – Naval Group, research contract (2019-2020) « Modeling of ablative materials : XFEM and Phase field approaches » : 20 k€

[13] **PI** – Naval Group, research contract (2018-2019) « multiscale modeling of porous elastomers with computational homogenization » : 20 k€

[12] **PI** – Safrantech, PhD contract (2018-2021) Thèse Minh Vuong Le : « Multiscale modeling of composites with mesostructures gradients » : 60 k€

[11] **PI** - Saint Gobain (2016-2017) : « Modeling of microcracking in foamed plaster samples » : 7 k€

[10] **PI** – DCNS (2016-2017) : « Design of Structures based on sublattices » : 20 k€

[9] **PI** - ANR PRCE Project "MMELED" (2016-2020) « Multiscale modeling and experimental investigations of damage in composite workpieces obtained by 3D printing » : 620 k€

[8] **Co-PI** - NEEDS CNRS-CEA Project (2016-2018) « 3D mesoscopic simulations of microcracking and creep in concrete including cement paste/inclusions interfaces » : 9.5 k€ (co- authors: Qi-Chang He, Benoit Barry)

[7] **Co-PI** – EDF (2014-2017) Thèse Jean-Luc Adia « Multiscale modelling of creep and hydric phenomena in concrete materials » (co- author: Qi-Chang He) : 60 k€+110k€ (PhD)

[6] **Co-PI** – EDF (2012-2013), financement de post-doc : « Simulation of Stress Corrosion Cracking » (co- author: Qi-Chang He) : 55 k€

[5] **Co-PI** - PPS Université Paris-Est (2011-2013) "Quantum and continuum mechanics for modelling nanostructures » (co-author: C. Léonard): 190 k€

[4] **PI** – EUROBIOS (2010) Meshfree methods for simulation of transport in porous media: 7 k€

[3] **Co-PI** – EDF (2009-2010) : « Numerical methods of microstructures calculations obtained from microtomography images » (co- author: Guy Bonnet) : 20 k€

[2] **Co-PI** - EDF, (2008-2011) « XFEM/Level-set modelling of effective properties of concrete by taking into account the effects of the microstructure and imperfect interfaces » (co- author: Qi-Chang He) 60 k€+110k€ (PhD)

[1] **Co-PI** – EDF (2007-2008) : “ XFEM/Level-set modeling of imperfect interfaces in concrete ” (co-author: Qi-Chang He) : 20 k€

#### As participant

[2] ANR Project « TYCHE" (2011-2013) Advanced numerical methods using high dimensions stochastic modeling for quantification and propagation of uncertainties in solids and fluids mechanics » (Main investigator : C. Soize)

[1] ANR Project « MOSAIC » (2012-2015), “ Stochastic modelling in nonlinear micromechanics ” (Main investigator : J. Guilleminot)

## VISITING POSITIONS

- National Technical University of Athens, Greece, professor Vissarion PAPADOPOULOS, October 2021.
- Boston University, Boston, USA, professor Harold PARK, October 2019.
- University of California at Berkeley, USA, Professeur Tarek ZOHDY, October 2018.
- Huazhong University of Science and Technology, Wuhan, China, Prof. Liang XIA, March 2018
- The University of Houston, Texas, USA, Prof. Pradeep SHARMA, January 2016
- The University of Houston, Texas, USA, Prof. Pradeep SHARMA, December 2014
- The University of Houston, Texas, USA, Prof. Pradeep SHARMA, March 2014
- Peking University, College of Engineering (China), Prof. Huiling DUAN, November 2012
- National University of Singapore (NUS), Singapore, Prof. Vincent TAN, Novembre 2011
- National University of Singapore (NUS), Singapore, Prof. Vincent TAN, March 2011
- Peking University, College of Engineering (China), Prof. Huiling DUAN, Octobre 2010
- Peking University, College of Engineering (China), Prof. Huiling DUAN, Octobre 2008
- The University of Saragoza (Spain), Prof. M. Doblaré et Francisco Chinesta, December 2005

## SHORT COURSES TAUGHT

- Introduction to numerical homogenization using finite elements, 17-21 January 2022, 2022, Colloque MECAMAT Matériaux architecturés, Aussois, France (Special invited course)
- Peking University, China: “An introduction to computational homogenization”, 11 October 2010
- Peking University, China: “Numerical methods for the multiscale analysis of solids: an introduction”, 14-15 October 2008

## TEACHING

ENSAM Paris (2003-2005)

396 hours/year as temporary professor

- Nonlinear structures mechanics (graduate level)
- Computational thermodynamics (graduate level)
- Multiphysics coupling (graduate level)
- Engineers projects advising (graduate level)

Université Paris-Est Marne-la-Vallée (2005-)

196 hours/year as associate and full professor

- Advanced numerical methods (doctoral level)
- Machine learning for mechanics
- Introduction to numerical methods and Finite Elements
- Computational homogenization of heterogeneous materials (graduate level)
- Instabilities of structures (graduate level)
- Finite Elements and optimization (graduate level)



- Material selection for engineers (graduate level)
- Boundary value problems and Finite Elements (undergraduate level)
- Solid mechanics (undergraduate level)
- Strength of materials (undergraduate level)
- Materials Sciences (undergraduate level)
- Complex curves and surfaces (undergraduate level)
- Manufacturing technologies (undergraduate level)

## ADVISING

Doctoral students supervised

4 ongoing PhD theses

24 defended PhD theses

- **ZEAITER** Nour (2024-)
- **LI** Zhonghua (2023-)
- **MONTAZEL Arthur** (2023-)
- **ABOU EID** Jana (2022-)
- **CHAFIA** Zakaria (2021-)
- **KETATA** Ali (2021-)
- **CHAOUCH** Souhail (2021-2024), Artificial Intelligence and Computational Material Science – AI Based Two-Scale Homogenization »
- **CHEN** Xing (2021-2024), « Topology optimization for energy harvesting systems based on piezoelectric composites »
- **WU** Yi (2017-2022) “Design and robust design of structure and material in dynamics via topology optimization”
- **BEGKOU** Franck (2020-2023) « Energy performance of printable concrete walls incorporating phase-change materials (PCMs) and plant fibers: experimental approach and modeling of thermo-hydric behavior”  
Co-advisor : Karim Benzarti (Univ Gustave Eiffel), M.A. Boudenne(Univ Paris-Est Creteil), A. Eddhahak (ENSAM Paris)  
Funding : LABEX MMCD
- **BENAIMECHE** Amine (2018-2021) « Modelling and simulation of mechanical swelling effects due to corrosion of metallic inclusions in concrete matrices »  
Co-advisor : Qi-Chang HE (Univ. Paris Gustave Eiffel, MSME)  
Funding : CEA/ORANO
- **LE** Minh Vuong (2017-2020) « Multiscale modeling of structure with gradient of properties »
- **LI** Pengfei (2017-2020) « Multiscale numerical modeling and experimental investigation of damage in 3D-printed polymer-glass composites »
- **HUN Darith-Anthony** (2016-2020) « Multiscale modeling of hydric drying-induced cracking: computational modeling, experimental validations and stochastic models »  
Defended 28 May, 2020  
Co-adviser : J. Guilleminot (Duke University, USA), M. Bornert (Ecole des Ponts ParisTech)  
Funding: LABEX MMCD
- **NGUYEN Nhu** (2016-2019) « Multiscale modeling of fracture in quasi brittle materials »  
Defended 19 April, 2019

Funding: Vietnamian government

- **KODJO Jérôme (2015-2019)** « Multiscale modeling of concrete incorporating thermal phase change particles »  
Co-advisors : K. Sab (Navier, ENPC), M. Karkri (CERTES, Univ-Paris-Est Créteil)  
Funding : Labex MMCD
- **DA Daicong (2016-2018)** « Topological homogenization in heterogeneous materials”  
Funding: Chinese Scholarship Council
- **ADIA Jean-Luc (2014-)** “Multiscale modelling of shrinkage and creep effects in cementitious materials»  
Co-advisor : Qi-Chang HE (Univ. Paris-Est MLV, MSME)  
Funding : EDF R&D
- **LU Xioxin (2014-2017)** « Multiscale electro-mechanical modeling of graphene/polymer nanocomposites”  
Co-advisor : J. Bai (Ecole Centrale de Paris), Fabrice Detrez (Univ. Paris-Est MLV, MSME)  
Funding : (Ecole Centrale de Paris)
- **HOANG Trung Hieu (2012-2015)** « Incremental computational homogenization approaches for elastoplastic and viscoplastic heterogeneous structures calculations»  
Co-advisor : M. Guerich (Ecole Supérieure d’Ingénieurs Léonard de Vinci)  
Funding : Ecole supérieure d’ingénieurs Léonard de Vinci
- **NGUYEN Thanh Tung (2012-2015)** «Approaches combining imagery and numerical simulation for study of cement-based materials»  
Co-advising : M. Bornert, (Navier, ENPC), Q.-Z. Zhu, (Univ. Paris-Est MLV, MSME)  
Funding : LABEX MMCD
- **HOANG Minh Tuan (2011-2014)**, « Multiscale modelling of piezoelectrical nanostructures»  
Co-advising : G. Chambaud (Univ. Paris-Est MLV, MSME), A. Mitrushchenkov (Univ. Paris-Est MLV, MSME)  
Funding: PPS project Univ. Paris-Est MLV.
- **LE Ba Anh (2010-2014)** « Computational homogenization of elastoplastic heterogeneous materials »  
Defended 24 January, 2014  
Co-adviser : Q.-C. He (Univ. Paris-Est MLV)  
Funding: Grant from Univ. Paris-Est MLV
- **CONG Yu (2011-2014)** « **Multiscale modelling of heterogeneous shells with micro and nano structures** »  
Defended 6 December, 2013  
Co-advising : H. Zahrouni (Université de Lorraine, LEM3)  
Funding: Grant from Univ. Lorraine
- **TRAN Anh Binh (2008-2011)** « Development of multiscale computational methods for heterogeneous elastic and viscoelastic structures »  
Defended 13 October, 2011  
Co-adviser: Q.-C. He (Univ. Paris-Est MLV)  
Funding: EDF R&D
- **MONTEIRO Eric (2006-2010)** « Contributions to computational methods for treating nonlinearities and discontinuities in heterogeneous materials »  
Defended 11 March, 2010  
Co-adviser: Q.-C. He (Univ. Paris-Est MLV)  
Funding: Grant from Univ. Paris-Est MLV

- **NEZAMABADI Saeid (2005-2009)** « Asymptotical numerical method for the multiscale analysis of instabilities of structures »  
Defended 11 March, 2010  
Co-adviser: H. Zahrouni (Université de Lorraine, LEM3)  
Funding: Grant from Univ. Lorraine  
**(Award for best PhD Thesis, Computational Structural Modeling Association, 2009)**
- **TO Quy-Dong (2005-2009)** « Analysis and simulation of contact and damage in tempered glass structures »  
Defended 19 November, 2007  
Co-adviser: Q.-C. He (Univ. Paris-Est MLV)  
Funding: CSTB

### Post-doctoral fellows advising

- Pavan Kumar (2021-2022)  
(co-advisors: Qi-Chanh He, Univ Gustave Eiffel, Marci Paggi, Univ IMT Lucca, Italy).
- Pengfei LI (2020)
- Liang XIA (2016-2017)  
Co-advisor: S. Ghabezloo, (NAVIER).
- Massoud SHAHROKHI (2015-2016)  
Co-advisor: C. Léonard (MSME), G. Stolz, V. Ehlacher (CERMICS)
- Amen TOGNEVI (2013-2015)  
Co-advisors : M. Guerich (Ecole Supérieure d'Ingénieurs Léonard de Vinci), M. Karkri (CERTES Lab, Université Paris-Est Créteil, UPEC)
- Duc Hieu HOANG (2012-2013)  
Co-advising: Q.-C. He (Univ. Paris-Est MLV), C. Toulemonde (EDF R&D), T. Couvant (EDF R&D)
- Shui-Tao GU (2010-2011)  
Co-advising: Q.-C. He (Univ. Paris-Est MLV), A. Mitrushchenkiv (Univ. Paris-Est MLV)
- Qizhi ZHU (2008-2009)  
Co-advising: Q.-C. He (Univ. Paris-Est MLV),

### Master students supervised

- D.T. LE « Modeling abaltive materials with XFEM and phase fields methods», Université Gustage Eiffel (2020)
- D.M. Tran, «Computations on image-based models using multiscale approaches», Université Paris-Est (2019)
- M.V. Le, « Modeling of aircraft composites without scales separation”, Université Paris-Est/SafranTech (2017)
- T. Zhang, «Modélisation de la fissuration dans les milieux poreux », Université Paris-Est/Saint Gobain Recherche (2016)
- Q. ZAN, «Modélisation et simulation numérique de la fissuration et de l’effondrement d’une matrice de gypse moussé », Université Paris-Est/Saint Gobain Recherche, 2015.
- D.A. HOANG, «Méthode de champs de phase pour la modélisation de l’endommagement des interfaces », Université Paris-Est, 2014.

- C. SHENG, «Calculs de microstructures complexes par éléments finis », Université Paris-Est, 2013.
- T.T. TRAN, «Homogénéisation numérique et modèles stochastiques pour les milieux hétérogènes sans séparation d'échelle », Université Paris-Est (2013)
- E. PETION, «Modélisation multi échelle numérique du fluage lié aux effets hydriques dans le béton », Université Paris-Est (2013)
- T.T. NGUYEN, "Développement de nouveaux schémas itératifs pour les calculs de microstructures obtenus à partir d'images de microtomographie", Université Paris-Est (2012)
- T.T. DANG, "Fissuration intergranulaire dans les milieux polycristallins par une approche XFEM/level-set", Université Paris-Est (2011)
- B.A. LE, "Homogénéisation de matériaux hétérogènes non linéaires par une approche numérique séquentielle à deux échelles", Université Paris-Est (2010)
- M.H. HA, "Calcul d'Estimateurs et de bornes de propriétés effectives d'échantillons de béton à partir d'images de tomographies", Université Paris-Est (2010)
- A. B. TRAN, « Modélisation par une approche de type XFEM/level-set des propriétés effectives des bétons avec la prise en compte de la microstructure granulaire et d'interfaces imparfaites », Université Paris-Est (2008)
- E. MONTEIRO, « Analyse de la diffusion non-linéaire dans les matériaux poreux par une approche multi-échelle », Université de Marne-la-Vallée (2006)
- T.H. PHUNG, « simulation numérique du soufflage des polymères par une méthode sans maillage », Université de Marne-la-Vallée. (2006)
- F. LEBEL « Etude du procédé RTM par différentes approches numériques », ENSAM Paris (2005)
- L.A. ILLOUL, « Extension de la méthode des éléments naturels contraints au cas 3D », ENSAM Paris (2004)

## **UNIVERSITY SERVICE ACTIVITIES**

Université Paris-Est Marne-la-Vallée

- 2015                    Committee of Research of UPEM
- 2012-                    Master coordinator, « Mechanics and Civil Engineering »
- 2012-                    LABEX MMCD executive committee
- 2012-2013            Chairman, recruitment committee
- 2008-2012            Master coordinator, « Projects in Civil Engineering »

## **PROFESSIONAL SERVICE ACTIVITIES**

Editorial board in international Journals

- [9] 2023 -            **Advanced Modeling and Simulation in Engineering Sciences (AMSES)**  
Springer
- [8] 2022 -            **Computer Methods in Applied Mechanics and Engineering (CMAME)**  
Elsevier

<https://www.journals.elsevier.com/computer-methods-in-applied-mechanics-and-engineering/editorial-board>

- [7] 2020 - **International Journal for Multiscale Computational Engineering**  
Begell House  
<https://www.begellhouse.com/journals/multiscale-computational-engineering/editorial.html>
- [6] 2020 - **Forces in Mechanics**  
Elsevier  
<https://www.journals.elsevier.com/forces-in-mechanics/editorial-board>
- [5] 2020 - **Mechanics of Size-dependent materials**  
Springer
- [4] 2018 - **Springer Nature Applied Sciences (SNAS)**  
Springer Nature  
(Guest editor of the Topical collection «Computational multiscale modelling and analysis in engineering and mechanics»)
- [3] 2016 – **Journal of Micromechanics and Molecular Physics**  
<http://www.worldscientific.com/page/jmmp/editorial-board>
- [2] 2015 - **Multiscale Multiphysics Mechanics**  
[http://www.techno-press.org/renewal/?page=journal\\_info&journal=mmm#](http://www.techno-press.org/renewal/?page=journal_info&journal=mmm#)
- [1] 2013-2017 **Journal of Computational Engineering**  
<http://www.hindawi.com/journals/jcompeng/editors/>

Guest editor of special issues in international journals

- [2] 2019 **Advanced Modeling and Simulation in Engineering Sciences**: special issue on: “Computational Modeling of Complex Materials Across the Scales”  
(Guest editors: Julien Yvonnet, Paul Steinmann (Erlangen-Nurnberg University, Marc Geers (Technical University of Eindhoven), and Andrew McBride (Univ. Glasgow)
- [1] 2019 - **Computational Mechanics** : special issue on « Data-Driven Modeling and Simulation: Theory, Methods, and Applications” (Guest editors: Wing Kam Liu, Northwestern University, George Karniadakis, Brown University, Shaoqiang Tang, Peking University, Julien Yvonnet, Université Paris-Est

Organization of international or national scientific conferences

**As main organizer**

- [5] Co-chair, (P. Steinmann, J. Yvonnet, M.G.C. Geers), **ECCOMAS Thematic Conference**, "Computational modeling of complex materials across the scales (CMCS2019)", Glasgow, 1-4 October, 2019.

- [4] J. Yvonnet (President of the Scientific Committee), F. Feyel, M. Potier-Ferry (vice-presidents), H. Zahrouni (president of local organization committee), **14e French National Computational Mechanics Congress (CSMA2019)**, Giens, France, 13-17 May, 2019.
- [3] Chair and local organizer (J. Yvonnet, M.G.C. Geers, P. Steinmann), **ECCOMAS Thematic Conference**, "Computational modeling of complex materials across the scales (CMCS)", Paris, 7-9 November 2017.
- [2] Co-chair, (V. Kouznetsova, J. Yvonnet, C. Miehe), **EUROMECH Colloquium 559**, "Multi-scale Computational Methods for Bridging scales in materials and structures, Eindhoven, The Netherlands, 23-25 February, 2015.
- [1] Chair and local organizer (J. Yvonnet, M.G.C. Geers, F. Feyel), **EUROMECH Colloquium 537**, "Multi-scale Computational Homogenization of Heterogeneous Structures and materials", Université Paris-Est Marne-la-Vallée, 26-28 March 2012.

### **As organizer of Minisymposia**

- [18] Minisymposium organizer (Julien Yvonnet, Patrice Cartraud, Régis Cottureau, Djimédo Kondo), MS Approches multi-échelles en mécanique des solides, Congrès Français de Mécanique (CFM 2022) 29 Août- 2 septembre 2022, Nantes, France.
- [17] Minisymposium organizer (J. Yvonnet, K. Terada, P. Wriggers, M.G.C. Geers, K. Matous, P. Steinmann), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, 15th World Congress on Computational Mechanics (WCCM-ECCOMAS) 31 July- 5 August 2022, Yokohama, Japan.
- [16] Minisymposium organizer (J. Yvonnet, K. Terada, P. Wriggers, M.G.C. Geers, K. Matous, P. Steinmann), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMA2022) June 5-9, 2022, Oslo, Norway
- [15] Minisymposium organizer (M.G.C. Geers, J. Yvonnet), Session Multi-scale plasticity, damage models & scale bridging, XVI International Conference on Computational Plasticity. Fundamentals and Applications - COMPLAS 2021, 7-10 September 2021, Barcelona, Spain.
- [14] Minisymposium organizer (J. Yvonnet, K. Terada, P. Wriggers, M.G.C. Geers, K. Matous, P. Steinmann), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, 14th World Congress on Computational Mechanics (WCCM-ECCOMAS) 11-15 January 2021, Paris, France, Virtual congress.
- [13] Minisymposium organizer (J. Yvonnet, M.G.C. Geers, K. Terada, K. Matous), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, 13th World Congress on Computational Mechanics (**WCCM**) 2018, July 22-27, 2018, New-York, USA.
- [12] Minisymposium organizer (J. Yvonnet, M.G.C. Geers, K. Terada), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, 6th European Conference on Computational Mechanics (**ECCM**) 2018, June 11-15, 2018, Glasgow, UK.
- [11] Minisymposium organizer (J. Yvonnet, V. Kouznetsova, K. Terada, K. Matous), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, 14<sup>th</sup> US National Congress on Computational Mechanics (**USNCCM**) 2017, July 17-20 2017, Montreal, Canada.
- [10] Minisymposium organizer (S. Brisard, J. Yvonnet), 2016 **Engineering Mechanics Institute International Conference** (EMI 2016), 25-27 October 2016, Metz, France.
- [9] Minisymposium organizer (J. Yvonnet, M.G.C. Geers, K. Terada, P. Wriggers), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials,

VIIth European Congress on Computational Mechanics in Applied Sciences and Engineering (**ECCOMAS**) 2016, June 5-10 2016, Crete Island, Greece.

[8] Minisymposium organizer (J. Yvonnet, M.G.D. Geers, K. Terada, P. Wriggers, M. Cho), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, **USNCCM** 2015, July 26-30 2015, San Diego, USA.

[7] Minisymposium organizer (J. Yvonnet, M.G.D. Geers, K. Terada, P. Wriggers), MS Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, **WCCM** 2014, July 20-25 2014, Barcelona, Spain.

[6] Minisymposium organizer (H.L. Duan (Peking Univ. China), J. Yvonnet), MS 101 “Multi-scale modeling of surface effects in nanomaterials and heterostructures”, 5th Asia Pacific Congress on Computational Mechanics & 4th International Symposium on Computational Mechanics (**APCOM** 2013), 11-14 December 2013, Singapore.

[5] Minisymposium organizer (J. Yvonnet, V. Kouznetsova (Eindhoven University of Technology), K. Terada (Tohoku Univ., Japon), P. Wriggers (Leibniz Univ. Hannover, Germany), M. Cho (Univ. Séoul, South Korea)), Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, **USNCCM** 2013, July 22-25 2013, Rayleigh, USA

[4] Minisymposium organizer (J. Yvonnet, M. Geers (Eindhoven University of Technology), K. Terada (Tohoku Univ., Japon), P. Wriggers (Leibniz Univ. Hannover, Germany)), MS102 Multiscale computational homogenization for bridging scales in the mechanics and physics of complex materials, **ECCOMAS** 2012, September 10-14, 2012, Vienna, Austria.

[3] Minisymposium organizer (J. Yvonnet, K. Terada (Tohoku Univ., Japon), P. Wriggers (Leibniz Univ. Hannover, Germany), J. Fish (Univ. of Columbia, USA)), MS-075 -Multiscale Computational Homogenization For Bridging Scales In The Mechanics And Physics Of Complex Materials, **WCCM** 2012, 8-13, July 2012, Sao Paulo, Brazil.

[2] Minisymposium organizer (J. Yvonnet, M. Dao (M.I.T., USA), V. Tan (National University of Singapore, Singapour))- Special session: “Multiscale Computational Nanomechanics”, Sixth **M.I.T. Conference** on Computational Fluid and Solid Mechanics, Massachusetts Institute of Technology, June, 15-17, 2011, Cambridge, USA.

[1] Minisymposium organizer (J. Yvonnet, H.S. Park (University of Boston, USA), V. Tan (National University of Singapore, Singapour))- S25: “Multiscale methods for modelling surface effects on nanosystems and nanostructured materials”, IV European Conference on Computational Mechanics (**ECCM IV**), May, 16-21, 2010, Paris, France.

### **As part of the scientific committee**

[16] Congrès français de mécanique 2022, 29 août-2 septembre 2022, Nantes, France.

[15] XVII International Conference on Computational Plasticity, **COMPLAS** 2023, 5-7 September, 2023.

[14] **CIGOS** - the International Conference series on Geotechnics, Civil Engineering Works and Structures, Ha Long city, Vietnam, Oct. 28-29, 2021

[13] 1st **IACM** conference for machine learning and digital twins for computational science and engineering, San Diego, USA, Sept. 26-29, 2021.

[12] Construction Digitalisation for Sustainable Development: Transforming through Innovation (**CDS2020**), Hanoi, Vietnam, October 2020.

[11] Innovation for Sustainable Infrastructures (**CIGOS 2019**), Hanoi, Vietnam, Oct. 31-Nov.1, 2019.

[10] 9th International Conference on Computational Methods (**ICCM2018**), Rome, Italy, August 6-10, 2018.

- [9] The 13th World Congress on Computational Mechanics (**WCCM XIII**) / 2nd Pan American Congress on Computational Mechanics (**PANACM II**), New York, USA, July 22-27, 2018. [8] International scientific committee member, 2016 Engineering Mechanics Institute International Conference (**EMI 2016**), 25-27 October 2016, Metz, France.
- [7] National scientific committee member, 13th Colloque en calcul de structures, **CSMA**, May 2017, Giens, France.
- [6] International scientific committee member, The 10th international conference on Mechanics of Time Dependent Materials (**MTDM 2016**). <http://mtdm2016.ensam.eu/node/42>.
- [5] International scientific committee member, The 6<sup>th</sup> International Conference on Computational Mechanics (**ICCM2015**, Auckland, New-Zealand, July 14-17, 2015).
- [4] International scientific committee member, **ECCOMAS** Extended discretization methods (**X6DMS 2015**) Ferrara, Italy, 9-11 Septembre 2015.
- [3] National scientific committee member, 12th Colloque en calcul de structures, **CSMA**, May 18-22, 2015, Giens, France.
- [2] International committee member, The 5<sup>th</sup> International Conference on Computational Methods (**ICCM2014**), Cambridge, England, 28-30 Juillet 2014.
- [1] International committee member, European Congress on Computational Methods in Applied Sciences and Engineering (**ECCOMAS**) Thematic conference : Composites with micro- and nano structures (CMNS) – Computational Modeling and Experiments (Liptovsky Mikulas, Slovakia, 28 – 31 Mai 2007).

### **Served as a reviewer for the following journals**

Advanced Modeling and Simulation in Engineering Science  
 Chinese Physics Letters  
 Composites Sciences and Technology  
 Computational Materials Science  
 Computational Mechanics  
 Computer Methods in Applied Mechanics and Engineering  
 Comptes Rendus de Mécanique  
 Continuum Mechanics and Thermomechanics  
 European Journal of Computational Mechanics  
 European Journal of Environmental and Civil Engineering  
 European Journal of Mechanics –A/Solids  
 Engineering Computations  
 Finite Element in Analysis and Design  
 Interaction and Multiscale Mechanics  
 International Journal for Numerical Methods in Engineering  
 International Journal of Solids and Structures  
 Journal of Computational Physics  
 Journal of Engineering Mechanics  
 Journal of Mathematical Analysis and Applications  
 Journal of the Mechanics and Physics of Solids  
 Journal of Medical Engineering  
 Materials



Meccanica  
Mechanics and Industry  
Modeling and Simulation in Materials Science and Engineering  
Multiscale Modeling and Simulation  
Numerical Heat Transfer  
Philosophical Magazine  
Proceedings of the Royal Society A

## **COMMUNICATIONS IN INTERNATIONAL AND NATIONAL (FRENCH) CONFERENCES – FULL LIST**

- [C159] (Plenary lecture) J. Yvonnet, ECCOMAS Reduced order models for fracture and path-dependent multiscale simulations: Macro Clustering and data-driven approaches, 6th International Workshop on Model reduction Techniques (MORTECH), Paris Saclay, 22-24 November 2023, France.
- [C158] (Invited lecture) J. Yvonnet, Q.-C. He, P. Li, Data-driven harmonic analysis Damage modeling (DDHAD) for multi-scale modelling of anisotropic damage, Seventh International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2023), Prague, Czechia, 21-23 June, 2023.
- [C157] (Invited lecture) J. Yvonnet, Unsupervised machine learning based on clustering for accelerating nonlinear multiscale simulations with internal variables, 14th International Symposium on Continuum Models and Discrete Systems, Paris, France – 26-30 June 2023.
- [C156] S. Chaouch, J. Yvonnet, A k-means clustering FE2 method based on unsupervised machine learning for nonlinear multiscale calculations, XVII International conference on Computational Plasticity (COMPLAS), Barcelonda, Spain, 5-7 September, 2023
- [C155] J. Abou eid, L. Adelaide, V. Bouteiiler, J. Yvonnet, Phase field modeling of corrosion-induced cracking in reinforced concrete structures, XVII International conference on Computational Plasticity (COMPLAS), Barcelonda, Spain, 5-7 September, 2023
- [C154] X. Chen, J. Yvonnet, S. Yao, Topology optimization of dynamic flexoelectric structures by isogeometric analysis, The 15th World Congress of Structural and Multidisciplinary Optimisation (WCSMO-15), Cork, Ireland 5th-9th June 2023
- [C153] S. Chaouch, J. Yvonnet, An Unsupervised Machine Learning Approach to Reduce Nonlinear Multiscale Calculations Using Clustering, 17th U. S. National Congress on Computational Mechanics (USNCCM), Albuquerque, New Mexico, July 23-27, 2023
- [C152] (invited lecture) J. Yvonnet, Q.-C. He, P. Li, Data-driven harmonic analysis for multi-scale construction of arbitrary anisotropic damage models with minimal number of internal variables, IUTAM Symposium on Data-Driven Mechanics, Paris, October 26-28, 2022. [C151] J. Yvonnet, Microcracking in heterogeneous materials, August 31, September 2, 2022, 8th international conference on "Advanced COmputational Methods in Engineering (ACOMEN)", Liège, Belgium (Plenary lecture)
- [C150] J. Yvonnet, M.A. Benaïmeche, S. Chaouch, B. Bary, Q.-C. He, Fast FE2 nonlinear multiscale simulations with loading path-dependent behaviors using k-means, June 5-9, 2022, The 8th European Congress on Computational Methods in Applied Sciences and Engineering ECCOMAS Congress 2022, Oslo, Norway.
- [C149] J. Yvonnet, Microfissuration des matériaux hétérogènes, May 16-22, 2022, 15e colloque national en calcul des structures, Giens, France (Plenary lecture)
- [C148] J. Yvonnet, Introduction à l'homogénéisation numérique par éléments finis, 17-21 January 2022, 2022, Colloque MECAMAT Matériaux architecturés, Aussois, France (Special invited course)
- [C147] J. Yvonnet, X. Lu, L. Papadopoulos, I. Kalogeris, V. Papadopoulos, A Stochastic FE2 Data-Driven Method for Nonlinear Multiscale Modeling, Mechanistic Machine Learning and Digital Twins

for Computational Science, Engineering & Technology, Sept. 26-29 2021, San Diego, USA (online participation)

[C146] M. A. Benaïmeche, J. Yvonnet, B. Bary, Q.-C. He, Two-scale damage modeling in nuclear waste packages with phase field modeling of microcracking due to corrosion product expansion, XVI International Conference on Computational Plasticity, 7-9 Sept. 2021, Barcelona, Spain. [C145] J. Yvonnet, P. Li, N. Nguyen, D. Hun, J. Guilleminot, Identification of macro phase field fracture models from micro and heterogeneous structure calculations, XVI International Conference on Computational Plasticity, 7-9 Sept. 2021, Barcelona, Spain (online participation)

[C144] P. Li, J. Yvonnet, C. Combescure, M. Nourai, H. Makich, An anisotropic elastoplastic phase field damage model for 3D printed materials and its experimental verification, XVI International Conference on Computational Plasticity, 7-9 Sept. 2021, Barcelona, Spain (online participation)

[C143] J. Yvonnet (invited lecture), Enhanced flexoelectricity in heterogeneous piezoelectric composites using topology optimization, IUTAM Symposium on Generalized continua emerging from microstructures, 19-23 July 2021, Paris, France. [C142] P. Li, J. Yvonnet, C. Combescure, Phase-field modeling of anisotropic brittle fracture in directional porous polymer, 14th World Congress on Computational Mechanics (WCCM-ECCOMAS) 2021 –Virtual Congress 11-15 janvier 2021.

[C141] M. V-Le, J. Yvonnet, F. Detrez, N. Feld, coarse mesh condensation multiscale (cmcm) method for full-field simulation of nonlinear heterogeneous structures, 14th World Congress on Computational Mechanics (WCCM-ECCOMAS) 2021 –Virtual Congress 11-15 janvier 2021.

[C140] J. Yvonnet, recent advances in topology optimization of heterogeneous structures for fracture propagation resistance, 14th World Congress on Computational Mechanics (WCCM-ECCOMAS) 2021 –Virtual Congress 11-15 janvier 2021.

[C139] (**invited lecture**) J. Yvonnet, X. Lu, F. Detrez, J. Bai, A two-scale FE2 method using neural networks, MORTech 2019 - 5th international Workshop on Reduced Basis, POD and PGD Model Reduction Techniques, 20-22 Nov. 2019, Paris, France.

[C138] B. Haddag, I. Benchikh, M. Nouari, H. Makich, M. Bornert, J. Yvonnet, Identification des propriétés d'élasticité d'un polymère obtenu par fabrication additive SLS à partir d'une modélisation du volume élémentaire représentatif, 24ème Congrès Français de Mécanique, 26-30 août 2019, Brest, France.

[C137] (**keynote lecture**) J. Yvonnet, T.T. Nguyen, M. Bornert, C. Chateau, Phase field method for microcracking simulations in concrete microstructure models obtained from 3D microtomography images, 10th International Conference on Fracture Mechanics of Concrete and Concrete Structures, FraMCoS-X, 23-26 juin 2019, Bayonne, France.

[C136] D.H. Hun, J. Guilleminot, J. Yvonnet, A. Dadda, A.M. Tang, M. Bornert, Computational modeling of crack propagation in a heterogeneous medium under drying conditions, Engineering Mechanics Institute 2019 (EMI) conference 18-21 June. 2019, Caltech, USA.

[C135] M.V. Le, J. Yvonnet, N. Feld, F. Detrez, The Reduced Condensation Domain Decomposition (RCDD) Method for simulations of heterogeneous structures, Engineering Mechanics Institute 2019 (EMI) conference 18-21 June. 2019, Caltech, USA.

[C134] T.T. Nguyen, J. Yvonnet, D. Waldmann, Phase field modeling of crack initiation and propagation under complex loading, VI International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2019), 12-14 June. 2019, Braunschweig, Germany.

[C133] T.T. Nguyen, J. Yvonnet, D. Waldmann, Q.C. He, Phase field modeling of interfacial crack propagation in quasi-brittle heterogeneous materials, VI International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2019), 12-14 June. 2019, Braunschweig, Germany.

[C132] D. Da, J. Yvonnet, L. Xia, Optimisation topologique de composites pour maximiser la résistance à la fracture, 14ème Colloque National en Calcul des Structures (CSMA 2019), 13-17 Mai 2019, Giens, France.

[C131] D.A. Hun, J. Yvonnet, J. Guilleminot, M. Bornert, Approche stochastique multi-échelles de la propagation de fissures dans les matériaux hétérogènes, 14ème Colloque National en Calcul des Structures (CSMA 2019), 13-17 Mai 2019, Giens, France.

[C130] M.V. Le, J. Yvonnet, N. Feld, F. Detrez, Une méthode Quasi-FE2 pour la résolution de

structures composites, 14<sup>ème</sup> Colloque National en Calcul des Structures (CSMA 2019), 13-17 Mai 2019, Giens, France.

[C129] J. Yvonnet (**Plenary lecture**), Numerical modeling of fracture in highly heterogeneous materials, XXXIX Ibero-Latin American Congress on Computational Methods in Engineering (CILAMCE 2018), Compiègne, France, 11-14 November 2018.

[C128] N. Nguyen, J. Yvonnet, J. Rethoré, Macroscopic Models For Crack Propagation In Heterogeneous Lattices Based On Phase Field Method, 13th World Congress on Computational Mechanics, New York, USA, 22-27 July 2018.

[C127] K. Kodjo, J. Yvonnet, M. Karkri, K. Sab, Multiscale Thermomechanical Analysis of Composites Containing Phase Change Materials, 13th World Congress on Computational Mechanics, New York, USA, 22-27 July 2018.

[C126] D.-A. Hun, J. Guillemot, J. Yvonnet, M. Bornert, Multi-scale Crack propagation in Random Heterogeneous media, 13th World Congress on Computational Mechanics, New York, USA, 22-27 July 2018.

[C125] J. Yvonnet, Topology optimization of particle-matrix composites for optimal fracture resistance, 13th World Congress on Computational Mechanics, New York, USA, 22-27 July 2018.

[C124] M.V. Le, J. Yvonnet, N. Feld, F. Detrez, a filter-based multiscale homogenization method for composite structures without scale separation, 6th European Conference on Computational Mechanics (ECCM6), Glasgow, UK, 11-15 June 2018.

[C123] (**Keynote lecture**) J. Yvonnet, D. Da, L. Xia, G. Li, Topology optimization for maximizing the fracture resistance of quasi-brittle composites, 6th European Conference on Computational Mechanics (ECCM6), Glasgow, UK, 11-15 June 2018.

[C122] K. Kodjo, J. Yvonnet, K. Sab, M. Karkri, Concurrent two-scale analysis of composites embedding phase change particles, 16th European Mechanics of Materials Conference (EMMC16), Nantes, France, 26-28 March 2018.

[C121] (Invited lecture) J. Yvonnet, T.T. Nguyen, M. Bornert, C. Chateau, Fissuration dans les microstructures de matériaux cimentaires : outils de simulation par la méthode de champ de phase, Colloque national MECAMAT Aussois « Matériaux Numériques », Aussois, France, 22-27 janvier 2018.

[C120] M.V. Le, J. Yvonnet, N. Feld, C. Combescure, filter-based computational homogenization Method for composites structures without Scale separation assumption, ECCOMAS Thematic Conference: Computational Modeling of Complex Materials across the Scales (CMCS 2017), 7-9 November 2017.

[C119] X. Lu, J. Yvonnet, F. Detrez, J. Bai, multiscale modeling of the electrical and mechanical properties of graphene-reinforced nanocomposites, ECCOMAS Thematic Conference: Computational Modeling of Complex Materials across the Scales (CMCS 2017), 7-9 November 2017.

[C118] N. Nguyen, J. Yvonnet, J. Rethoré, numerical identification of homogeneous phase field models to quasi-brittle fracture in heterogeneous periodic media, ECCOMAS Thematic Conference: Computational Modeling of Complex Materials across the Scales (CMCS 2017), 7-9 November 2017.

[C117] K. Kodjo, J. Yvonnet, K. Sab, M. Karkri, thermomechanical modeling of materials embedding phase change particles, ECCOMAS Thematic Conference: Computational Modeling of Complex Materials across the Scales (CMCS 2017), 7-9 November 2017.

[C116] (Keynote lecture) J. Yvonnet, T.T. Nguyen, M. Bornert, C. Chateau, L. Xia, Modelling of microcracking in image-based models of highly heterogeneous materials using the phase field method, 7th GACM Colloquium on Computational Mechanics, Stuttgart, Germany, 11-13 October, 2017.

[C115] X. Lu, J. Yvonnet, F. Detrez, J. Bai, Computational Homogenization of the Nonlinear Electrical Behavior of Graphene/Polymer Nanocomposites, 14th US National Congress on Computational Mechanics, Montreal, Canada, July 17-20, 2017.

- [C114] (Keynote lecture) J. Yvonnet, L. Xia, S. Ghabezloo, Phase Field Modeling of Hydraulic Fracturing with Interfacial Damage in Highly Heterogeneous Fluid-Saturated Porous Media, 14th US National Congress on Computational Mechanics, Montreal, Canada, July 17-20, 2017.
- [C113] J.-L. Adia, J. Yvonnet, Q.-C. He, N.-C. Tran, J. Sanahuja, Elastic shrinkage-swelling modeling in porous microstructures: a combined Finite Elements-Lattice Boltzmann-numerical approach. 6th Biot Conference on Poropomechanics, Paris, France, July 9-13 2017.
- [C112] N. Nguyen, J. Yvonnet, Multiscale, Phase field modeling of brittle cracking in heterogeneous materials, Fifth International conference on Computational Modeling of fracture of materials and structures, June 14-16, 2017.
- [C111] J. Yvonnet, L. Xia, S. Ghabezloo, Phase field modeling of hydraulic fracturing with interfacial damage in highly heterogeneous fluid-saturated porous media, Fifth International conference on Computational Modeling of fracture of materials and structures, June 14-16, 2017.
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## **Popularization papers**

[2] Advances in Engineering, 2019

<https://advanceseng.com/fracture-models-based-phase-field-crack-propagation-heterogeneous-lattices/>

[1] IACM expressions, #45, 2019

[https://iacm.info/wp-content/uploads/sites/19/2019/08/Expressions\\_45.pdf](https://iacm.info/wp-content/uploads/sites/19/2019/08/Expressions_45.pdf)