

Enrique García-Macías

BEng, MEng, MSc, PhD 15/08/1989

ORCID: 0000-0001-5557-144X; Research ID: L-2005-2015

✉ (+44) 07923094829 ✉ e.garcia-macias@imperial.ac.uk; enrique.garciamacias@unipg.it

Summary.....

During my 5 years of academic career I have published 28 high-impact scientific articles (18 as first author, h-index=10, 315 citations (Scopus)), contributed to more than 17 conferences, conducted research at 3 different institutions, delivered 174 hours of lectures and laboratory classes, supervised 4 students' dissertations and participated in 5 R&D contracts.

Education.....

01/09/2014 PhD Mechanical Engineering and Industrial Organization

01/09/2018

School of Engineering / Department of Continuum Mechanics and Structural Analysis / **University of Seville**, Spain. Supervisors: Andrés Sáez Pérez and Rafael Castro Triguero.

From 11/2015 to 03/2016 – Swansea University (UK)

From 06/2016 to 10/2016 – University of Perugia (Italy)

Thesis: “Carbon NanoTubes (CNTs) for the development of high-performance and smart composites”

Qualification: Summa Cum Laude

01/09/2012 M.Sc. in Structural Engineering

01/09/2013

Escuela Técnica Superior de Ingeniería de Caminos, Canales y Puertos (College of Civil Engineering) / **University of Granada**, Spain

Master's thesis: “Alternative methodologies to the semi-analytic solution to the problem of moving loads on high speed railway bridges based on the sensitivity of the response to train speed and on Hilbert's transformation”.

Qualification: 9.55/10, A GPA=4.00/4.00

01/09/2007 Degree in Civil Engineering (5-years degree: BEng+MEng)

01/09/2012

Escuela Técnica Superior de Ingeniería de Caminos, Canales y Puertos (College of Civil Engineering) / **University of Granada**, Spain

Dissertation: “Dynamics of bowstring arch high-speed railway bridges: case study, alternatives analysis and conclusions for the design”.

Qualification: 8.558/10, B+ GPA=3.30/4.00. **Valedictorian honours** (highest grade point average of the graduating class)

Current Position(s).....

01/12/2019 Teaching fellow

Present

Faculty of Engineering / Department of Civil and Environmental Engineering /

Imperial College London

01/12/2018 **Post-doctoral researcher**

01/12/2019

Faculty of Engineering / Department of Civil and Environmental Engineering /
University of Perugia, Italy. Group Head: Filippo Ubertini

Previous Positions.....

01/10/2013 **Research Assistant**

31/08/2014

Faculty of Engineering / Department of Mechanics / University of Córdoba, Spain /
University of Perugia, Italy. Group Head: Rafael Castro-Triguero

08/07/2013 **Industrial Experience: Civil Engineer**

30/09/2013

Three-month internship awarded in the M.Sc. in Structural Engineering. Among
the assigned tasks was the design of a training steel platform for ski cross, design
of a meteorological mast with wave-tide interaction, and design and fabrication of
in-house load cells.

Oritia y Boreas (Private company). Ojos del Salado 100, 18008, Granada, Spain.

Fellowships and Awards.....

- **Valedictorian honours** (2012) in the Faculty of Civil Engineering of the University of Granada (Spain). (Highest GPA in the graduating class).
- **Training programme grant** (2012). Two-months training programme granted by Fundación General UGR-Empresa, a foundation dedicated to the promotion of R&D activities between companies and the University of Granada. Contract nº C-3348: Structural analyses of civil infrastructure.
- **Pre-doctoral research Fellowship** (2013-2014) at the University of Córdoba.
- **University Teaching Staff Training** (Ref: FPU13/04892). Grant for Thesis, from the Ministry of Education, Culture and Sports of Spain (2014-2018) (Success ratio < 14%).
- **Best thesis award** (2019) in the field of Experimental and Technological Sciences by the Real Academia de Doctores de España (Royal Academy of Doctors of Spain).
- **Postdoctoral Fellowship** (2018-2019) at the University of Perugia (Italy).

Visiting Scholar Positions./External Research Stays.....

- **College of Engineering, Swansea University, United Kingdom** | Host: Prof. Michael Ian Friswell | November 2015 – March 2016 (5 months) | This research stay was funded by the FPU thesis grant.
- **Dipartimento Di Ingegneria Civile ed Ambientale, University of Perugia, Italy** | Host: Prof. Filippo Ubertini | June 2016 – October 2016 (4 months) | This research stay was funded by the FPU thesis grant.

Student supervision.....

BEng. Dissertation: *Micromechanics modelling of composite materials: comparison between analytic and numerical models*

Antonio Castro Sánchez	Aerospace Engineering University of Seville (2017/2018)
M.Eng. Thesis:	<i>Design and development of a low-cost wireless sensor for structural maintenance</i>
Alberto Merino Tamajón	Master of Industrial Engineering University of Córdoba (2016/2017)
BEng. Dissertation:	<i>Carbon Nanotube reinforced composite materials: optimal filler distribution</i>
Andrés Pérez Martínez	Mechanical Engineering University of Córdoba (2015/2016)
BEng. Dissertation:	<i>Analytical and numerical homogenisation of carbon nanotubes mixed in concrete matrix</i>
Germán Martínez Ayuso	Civil Engineering University of Alicante (2015/2016)

Teaching activities.....

Advanced Design of Structures and Industrial Constructions - BEng.	2013/2014
Mechanical Engineering Degree - Teaching assistant [4 hours]	University of Córdoba
Advanced Design of Structures and Industrial Constructions - BEng.	2014/2015
Mechanical Engineering Degree - Teaching assistant [8 hours]	University of Córdoba
Advanced Design of Structures and Industrial Constructions - BEng.	2015/2016
Mechanical Engineering Degree - Teaching assistant [8 hours]	University of Córdoba
Steel Structures I - BEng. Civil Engineering Degree -	2015/2016
Teaching assistant & Lab leader [23 hours]	University of Seville
Steel Structures - BEng. Industrial Technologies Degree -	2015/2016
Lab leader [5 hours]	University of Seville
Structural Engineering - M. Eng. Industrial Engineering Master -	2015/2016
Teaching assistant & Lab leader [32 hours]	University of Seville
Structural Engineering II - M. Eng. Industrial Engineering Master -	2016/2017
Teaching assistant [8 hours]	University of Seville
Advanced Design of Structures - M. Eng. Civil Engineering Master -	2016/2017
Teaching assistant & Module leader [40 hours]	University of Seville
Theory of Structures - BEng. Industrial Organization Degree -	2017/2018
Lecturer [42 hours]	University of Seville
Project of Structures - BEng. Civil Engineering Degree -	2018/2019
Lab leader [4 hours]	University of Perugia

Teaching publications

- García-Macías, Enrique, Castro-Triguero, Rafael, Saavedra Flores, Erick L, Yanez, Sergio J. and Hinrechsen, Karen. An interactive computational strategy for teaching the analysis of silo structures in civil engineering. Computer Applications in Engineering Education (2018), 1- 15. IF: 1.435, Citations: -. <https://doi.org/10.1002/cae.22112>

List of Peer-Reviewed Journal Papers¹

H index: 11 (Google Scholar), 10 (Scopus), 9 (Web of Science). Total number of citations: 400 (Google Scholar), 315 (Scopus), 276 (Web of Science). Scopus has been used for the citation counts hereafter, while the JCR database has been used for getting the Impact Factors (IFs).

- 1 **García-Macías, E.**, Castro-Triguero, R., Saavedra Flores, E. I., Friswell, M. I. and Gallego, R. Static and free vibration analysis of functionally graded carbon nanotube reinforced skew plates. *Composite Structures* (2016), 140, 473-490. IF: (Q1) 3.858, Citations: 45. <https://doi.org/10.1016/j.compstruct.2015.12.044>
- 2 **García-Macías, E.**, Castro-Triguero, R., Friswell, M. I., Adhikari, S. and Sáez, A. Metamodel-based approach for stochastic free vibration analysis of functionally graded carbon nanotube reinforced plates. *Composite Structures* (2016), 152, 183-198. IF: (Q1) 3.858, Citations: 17. <https://doi.org/10.1016/j.compstruct.2016.05.019>
- 3 **García-Macías, E.**, Rodríguez-Tembleque, L., Castro-Triguero, R. and Sáez, A. Buckling analysis of functionally graded carbon nanotube-reinforced curved panels under axial compression and shear. *Composites Part B: Engineering* (2017), 108, 243-256. IF: (Q1) 4.920, Citations: 39. <https://doi.org/10.1016/j.compositesb.2016.10.002>
- 4 **García-Macías, E.**, D'Alessandro, A., Castro-Triguero, R., Pérez-Mira, D. and Ubertini, F. Micromechanics modelling of the electrical conductivity of carbon nanotube cement-matrix composites. *Composites Part B: Engineering* (2017), 108, 451-469. IF: (Q1) 4.920, Citations: 56. <https://doi.org/10.1016/j.compositesb.2016.10.025>
- 5 **García-Macías, E.**, D'Alessandro, A., Castro-Triguero, R., Pérez-Mira, D. and Ubertini, F. Micromechanics modelling of the uniaxial strain-sensing property of carbon nanotube cement-matrix composites for SHM applications. *Composite Structures* (2017), 163, 195-215. IF: (Q1) 4.101, Citations: 52. <https://doi.org/10.1016/j.compstruct.2016.12.014>
- 6 **García-Macías, E.**, Downey, A., D'Alessandro, A., Castro-Triguero, R., Laflamme, S. and Ubertini, F. Enhanced lumped circuit model for smart nanocomposite cement-based sensors under dynamic compressive loading conditions. *Sensors and Actuators A: Physical* (2017), 260, 45-57. IF: (Q2) 2.311, Citations: 12. <https://doi.org/10.1016/j.sna.2017.04.004>
- 7 **Castro-Triguero, R.**, **García-Macías, E.**, Saavedra Flores, E., Friswell, M and Gallego, R. Multi-scale model updating of a timber footbridge using experimental vibration data. *Engineering Computations* (2017), 34(3), 754-780. IF: (Q3) 1.177, Citations: 1. <https://doi.org/10.1108/EC-09-2015-0284>
- 8 **García-Macías, E.**, Rodríguez-Tembleque, L., Castro-Triguero, R. and Sáez, A. Eshelby-Mori-Tanaka approach for post-buckling analysis of axially compressed functionally graded CNT/polymer composite cylindrical panels. *Composites Part B: Engineering* 128 (2017) 208-224. IF: (Q1) 4.920, Citations: 16. <https://doi.org/10.1016/j.compositesb.2017.07.016>

¹ As much information as possible is provided, including journal impact factors and number of citations, but DOI links are given to facilitate a more appropriate assessment. The corresponding author has been underlined.

- 9 [Downey, A., D'Alessandro, A., Baquera, M., Rolfes, D., Ubertini, F, García-Macías, E., Laflamme, Simon and Castro-Triguero, Rafael. Damage detection, localization and quantification in conductive smart concrete structures using a resistor mesh model.](https://doi.org/10.1016/j.engstruct.2017.07.022) Engineering Structures (2017), 148, 924-935. IF: (Q1) 2.755, Citations: 19.
<https://doi.org/10.1016/j.engstruct.2017.07.022>
- 10 [D'Alessandro, A., Ubertini, F., García-Macías, E., Castro-Triguero, R., Downey, A., Laflamme, S., Meoni, A. and Materazzi, A. L. Static and Dynamic Strain Monitoring of Reinforced Concrete Components through Embedded Carbon Nanotube Cement-Based Sensors.](https://doi.org/10.1155/2017/3648403) Shock and Vibration (2017), 2017, 3648403. IF: (Q2) 1.857, Citations: 9.
<https://doi.org/10.1155/2017/3648403>
- 11 [García-Macías, E., Rodríguez-Tembleque, L. and Sáez, A. Bending and free vibration analysis of functionally graded graphene vs. carbon nanotube reinforced composite plates.](https://doi.org/10.1016/j.compstruct.2017.11.076) Composite Structures (2018), 86, 123-138. IF: (Q1) 4.829, Citations: 46.
<https://doi.org/10.1016/j.compstruct.2017.11.076>
- 12 [Pachón, P., Castro, R., García-Macías, E., Compán, V. and Puertas, E. E. Torroja's bridge: Tailored experimental setup for SHM of a historical bridge with a reduced number of sensors.](https://doi.org/10.1016/j.engstruct.2018.02.035) Engineering Structures (2018), 162, 11-21. IF: (Q1) 3.084, Citations: 7.
<https://doi.org/10.1016/j.engstruct.2018.02.035>
- 13 [García-Macías, E. and Castro-Triguero, R. Coupled effect of CNT waviness and agglomeration: A case study of vibrational analysis of CNT/polymer skew plates.](https://doi.org/10.1016/j.compstruct.2018.03.001) Composite Structures (2018), 193, 87-102. IF: (Q1) 4.829, Citations: 3.
<https://doi.org/10.1016/j.compstruct.2018.03.001>
- 14 Meoni, A., D'Alessandro, A., Downey, A., **García-Macías, E.**, Rallini, M., Materazzi, A. L., Torre, L., Laflamme, S., Castro-Triguero, R. and Ubertini, F. An Experimental Study on Static and Dynamic Strain Sensitivity of Embeddable Smart Concrete Sensors Doped with Carbon Nanotubes for SHM of Large Structures. Sensors (2018), 18(3), 831. IF: (Q1) 3.031, Citations: 9. <https://doi.org/10.3390/s18030831>
- 15 [García-Macías, E., Castro-Triguero, R., and Ubertini F. Two-step hierarchical micromechanics model of partially saturated porous composites doped with ellipsoidal particles with interface effects.](https://doi.org/10.1016/j.compositesb.2018.04.037) Composites Part B: Engineering (2018), 148, 49-60. IF: (Q1) 6.864, Citations: 5.
<https://doi.org/10.1016/j.compositesb.2018.04.037>
- 16 [García-Macías, E., Castro-Triguero, R., Sáez, A. and Ubertini F. 3D mixed micromechanics-FEM modelling of piezoresistive carbon nanotube Smart concrete.](https://doi.org/10.1016/j.cma.2018.05.037) Computer Methods in Applied Mechanics and Engineering (2018), 340, 396-423. IF: (Q1) 4.821, Citations: 12.
<https://doi.org/10.1016/j.cma.2018.05.037>
- 17 [Rodríguez-Tembleque, L., García-Macías, E. and Sáez, A. CNT-polymer nanocomposites under frictional contact conditions.](https://doi.org/10.1016/j.compositesb.2018.08.003) Composites Part B: Engineering (2018), 154, 114-127. IF: (Q1) 6.864, Citations: 9. <https://doi.org/10.1016/j.compositesb.2018.08.003>

- 18 **García-Macías, E.**, Rodríguez-Tembleque, Luis and Sáez, Andrés. MWCNT/epoxy strip-like sensors for buckling detection in beam-like structures. *Thin-Walled Structures* (2018), 133, 27-41. IF: (Q1) 3.488, Citations: 4. <https://doi.org/10.1016/j.tws.2018.09.013>
- 19 **García-Macías, E.**, Guzmán, C. F., Saavedra Flores, E. I. and Castro-Triguero, R. Multiscale modelling of the elastic moduli of CNT-reinforced polymers and fitting of efficiency parameters for the use of the extended rule-of-mixtures. *Composites Part B: Engineering* (2018), 159, 114-131. IF: (Q1) 6.864, Citations: 13. <https://doi.org/10.1016/j.compositesb.2018.09.057>
- 20 **García-Macías, E.**, Rodríguez-Tembleque, L., Sáez, A. and Ubertini F. Crack detection and localization in RC beams through smart MWCNT/epoxy strip-like strain sensors. *Smart Materials and Structures* (2018), 27-11, 115022. IF: (Q1) 3.543, Citations: 4. <https://doi.org/10.1088/1361-665X/aae668>
- 21 **García-Macías, E.** and Ubertini F. Earthquake-induced damage detection and localization in masonry structures using smart bricks and Kriging strain reconstruction: A numerical study. *Earthquake Engineering & Structural Dynamics* (2018), 1-22. IF: (Q1) 3.419, Citations: 4. <https://doi.org/10.1002/eqe.3148>
- 22 **Martínez Castro, A. E.** and **García-Macías, E.** Train-speed sensitivity approach for maximum response envelopes in dynamics of railway bridges. *Journal of Sound and Vibration* (2019) 452, 13-33. IF: (Q1) 3.123, Citations: -. <https://doi.org/10.1016/j.jsv.2019.04.004>
- 23 **Infantes, M.**, Vidal, P., Castro-Triguero, R., Gallimard, L., **García-Macías, E.** and Polit, O. Forced vibration analysis of composite beams based on the variable separation method. *Mechanics of Advanced Materials and Structures* (2019), 1-17. IF: (Q1) 2.873, Citations: 1. <https://doi.org/10.1080/15376494.2019.1578015>
- 24 **García-Macías, E.** and Ubertini, F. Seismic interferometry for earthquake-induced damage identification in historic masonry towers. *Mechanical Systems and Signal Processing* (2019) 131, 380-404. IF: (Q1) 5.005, Citations: -. <https://doi.org/10.1016/j.ymssp.2019.06.037>
- 25 **García-Macías, E.**, Ierimonti, L., Venanzi, I., and Ubertini, F. An innovative methodology for online surrogate-based model updating of historic buildings using monitoring data. *International Journal of Architectural Heritage* (2019), 1-21. IF: (Q3) 1.440, Citations: 2. <https://doi.org/10.1080/15583058.2019.1668495>
- 26 **García-Macías, E.**, Kita, A., and Ubertini, F. Synergistic application of operational modal analysis and ambient noise deconvolution interferometry for structural and damage identification in historic masonry structures: three case studies of Italian architectural heritage. *Structural Health Monitoring* (2019). IF: (Q1) 4.939, Citations: -. <https://doi.org/10.1177/1475921719881450>
- 27 **Pachón, P.**, Macías, I., Cámaras, M., Compán, V., **García-Macías, E.**, Friswell, M. I., and Castro-Triguero, R. Evaluation of optimal sensor placement algorithms for the Structural Health Monitoring of architectural heritage. Application to the Monastery of San Jerónimo de Buenavista (Seville, Spain). *Engineering Structures* (2019), 202, 109843. IF: (Q1) 3.084.

Citations:-. <https://doi.org/10.1016/j.engstruct.2019.109843>

- 28 Krishnaswamy, J. A., Buroni, F., García-Macías, E., Melnik, R., Rodríguez-Tembleque, R., and Sáez, A. Design of lead-free PVDF/CNT/BaTiO₃ piezocomposites for sensing and energy harvesting: The role of polycrystallinity, nanoadditives, and anisotropy. Smart Materials and Structures (2019), 29(1), 015021. IF: (Q1) 3.543, Citations: -. <https://doi.org/10.1088/1361-665X/ab547d>
- 29 Krishnaswamy, J. A., Buroni, F. C., García-Macías, E., Melnik, R., Rodriguez-Tembleque, L., & Sáez, A. (2020). Design of nano-modified PVDF matrices for lead-free piezocomposites: Graphene vs carbon nanotube nano-additions. Mechanics of Materials, 142, 103275. IF: (Q1) 2.958, Citations: -. <https://doi.org/10.1016/j.mechmat.2019.103275>
- 30 Birgin, H. B., Laflamme, S., D'Alessandro, A., Garcia-Macias, E., & Ubertini, F. (2020). A Weigh-in-Motion Characterization Algorithm for Smart Pavements Based on Conductive Cementitious Materials. Sensors, 20(3), 659. IF: (Q1) 3.031, Citations: -. <https://doi.org/10.3390/s20030659>
- 31 Rodríguez-Tembleque, L., García-Sánchez, F., García-Macías, E., Buroni, F. C., & Sáez, A. (2020). Crack-induced electrical resistivity changes in cracked CNT-reinforced composites. Theoretical and Applied Fracture Mechanics, 102470. IF: (Q1) 2.848, Citations: -. <https://doi.org/10.1016/j.tafmec.2019.102470>

List of Peer-Reviewed Journal Papers under review.....

- 1 García-Macías, E. and Ubertini, F. Automated operational modal analysis and ambient noise deconvolution interferometry for the full structural identification of historic towers: A case study of the Sciri Tower in Perugia, Italy. Engineering Structures. IF: 3.543.
- 2 García-Macías, E. and Ubertini, F. MOVA/MOSS: Two integrated software solutions for comprehensive Structural Health Monitoring of structures. Computer-Aided Civil and Infrastructure Engineering. IF: 6.208.
- 3 García-Macías, E. and Martínez-Castro, A. Hilbert transform-based semi-analytic meta-model for maximum response envelopes in dynamics of railway bridges. Computers and Structures. IF: 3.354.

Book chapters.....

- 1 García-Macías, E., and Ubertini, F. Chapter 5: Mathematical Modelling and Simulation. Smart Nanoconcretes and Cement-Based Materials 1st Edition. Editors: Mohd Shahir Liew Phuong Nguyen-Tri Tuan Anh Nguyen Saeid Kakooei. ISBN: 9780128178546. Publisher: Elsevier.

- 2 García-Macías, E., Castro-Triguero, R., and Sáez, A. Chapter 8: Micromechanics modeling of nanomodified cement-based composites. Nanotechnology in Cement-Based Construction 1st Edition. Editors: Annibale Luigi Materazzi, Filippo Ubertini, Antonella D'Alessandro. ISBN: 9789814800761. Publisher: Jenny Stanford Publishing.

Selected Conference Presentations.....

- International Conference on Boundary Element and Meshless Techniques XIX. Málaga, Spain, 2018
- 1st Conference on Structural Dynamics (DinEst). Madrid, Spain, 2018.
- The International Society for Optical Engineering (SPIE), Portland, USA, 2017.
- International Conference on Mechanical Models in Structural Engineering (CMMoST), Madrid, Spain, 2017
- 4th International Electronic Conference on Sensors and Applications. Online Conference, 2017.
- XXXIV International Modal Analysis Conference (IMAC). Orlando, Florida, USA, 2016
- 2nd Mechanics of Composites Conference. University of Porto, Porto, Portugal, 2016.
- XXIII International Modal Analysis Conference (IMAC). Orlando, Florida, USA, 2015
- 6th International Operational Modal Analysis Conference (IOMAC). Gijón, Spain, 2015.
- 6th International Conference on Experimental Vibration Analysis for Civil Engineering Structures (EVACES). Dubendorf, Zurich; Switzerland, 2015.
- 9th International Conference on Structural Dynamics (EURODYN), Porto, Portugal, 2014

List of R&D Projects Funded Through Competitive Calls of Public or Private Entities.....

PROJECT TITLE: Smartness - exploración computacional para el diseño de materiales compuestos con acoplamiento electromecánico en una economía sostenible. (Computation exploration for the design of composite materials with electromechanical coupling for a sustainable economy) – 103 k€.

Ref: DPI2017-89162-R

FUNDING ENTITY: Ministerio de Economía y Competitividad (Spanish Ministry of Economy and Competitiveness).

DURATION: 2018-2021

PI: Luis Rodríguez-Tembleque and Federico Carlos Buroni Cúneo

PROJECT TITLE: ALC3: Adaptación de infraestructuras civiles frente al cambio climático. (Adapting civil infrastructures to climate change) – 100 k€..

FUNDING ENTITY: Corporación Tecnológica de Andalucía (Technological Corporation of Andalusia).

DURATION: 2017-2023

PI: Rafael Castro Triguero

PROJECT TITLE: Monitorización predictiva de estructuras civiles mediante elementos reforzados con nanotubos de carbono. (Structural Health Monitoring of civil structures through elements doped with carbon nanotubes) – 139 k€.. **Ref:** DPI2014-53947-R

FUNDING ENTITY: Ministerio de Economía y Competitividad (Spanish Ministry of Economy and Competitiveness).

DURATION: 2015-2018

PI: Felipe García Sánchez

PROJECT TITLE: *Red sobre técnicas experimentales en dinámica estructural, actualizado computacional, dispositivos de mitigación de vibraciones y evaluación del estado límite de servicio. (Network on experimental techniques for structural dynamics, model updating, devices for vibration mitigation and evaluation of limit service states) – 20 k€.* **Ref:** BIA2015-71942-REDT

FUNDING ENTITY: Ministerio de Economía y Competitividad (Spanish Ministry of Economy and Competitiveness).

DURATION: 2013-2014

PI: Antolín Lorenzana Ibán

PROJECT TITLE: *SMORE: Empleo de materiales compuestos de base cemento enriquecido con nanotubos de carbono en ingeniería de control de gran escala. (SMORE: Use of cement-based materials doped with carbon nanotubes for large-scale control engineering) – 75 k€.*

FUNDING ENTITY: Corporación Tecnológica de Andalucía (Technological Corporation of Andalusia).

DURATION: 2013-2014

PI: Rafael Castro Triguero