

# Leopoldo Vincenzo Greco

## *Curriculum Vitae*

### Contacts

-Born in Italy (CT) on September 6<sup>th</sup>, 1975.

-Marital status: single.

-Address: International Research Center on Mathematics and Mechanics of Complex Systems, M&MOCS, University of l'Aquila, Via Giovanni Gronchi 18 - Zona industriale di Pile, 67100 l'Aquila, Italy. (Fax.: 0862.434548).

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### Degrees

2017: **Italian Scientific Habilitation** to Associate Professor of Mechanics of Solids and Structures.

2008: **Ph.D** in Structural Engineering at the University of Catania, title of thesis "*Instability of thin membrane with strong curvatures*".

2004: **Italian engineering professional license**, obtained with the grade of 110/110.

### Post-doc research contracts

2013 – 2017: **Post-doctoral** fellow at the **M&MOCS** of the University of l'Aquila.

2012 – 2013: **Post-doctoral** fellow at the **DICAR** of the University of Catania.

2010 – 2011: **Post-doctoral** fellow at the **DICA** of the University of Catania.

### Contracts

2016 - 2017: **Research Associate**, "Mechanics of Solids and Structures", at the **DII** of the University of Catania.

2015 - 2016: **Research Associate**, "Mechanics of Solids and Structures", at the **DIEEI** of the University of Catania.

2014 - 2015: **Research Associate**, "Static of Solid", at the **SDS** of the University of Catania.

## **Organization of congresses, symposia and thematic sessions**

Special session New Application of Isogeometric Methods to Structural Analysis del Eleventh International Conference on Computational Structure Technology, (Civil-Comp Proceedings:99) ed. B.H.V. Topping, Dubrovnik –Croatia, 4-7 September 2012. ISSN: 1759-3433, ISBN 978-1-905088-54-6.

XVIII Italian Meeting of Computational Mechanics GIMC2010, 22-24 September 2010, Siracusa. Italy.

## **Research:**

- Development finite elements with high regularity (i.e. isogeometric methods) for thin structural model, rods, plates and shells. The research is focused on the multi-patch or multi-element isogeometric formulation with particular interest on the study of the continuity conditions at the joins of the structural elements.
- Development of mixed finite element to avoid locking pathologies: membrane, flexural and shear locking in rod, plate and shells.
- Development of higher order continua and numerical implementation.
- Development of optimization and form-finding procedures.

## **Publications:**

Cuomo M, dell'Isola F, GRECO L., Rizzi N.L., First versus second gradient energies for planar sheets with two families of inextensible fibres: Investigation on deformation boundary layers, discontinuities and geometrical instabilities. COMPOSITES. PART B, ENGINEERING, ISSN: 1359-8368, doi: 10.1016/j.compositesb.2016.08.043

Dell'Isola F, Cuomo M, GRECO L., della Corte A, Bias extension test for pantographic sheets: numerical simulations based on second gradient shear energies. JOURNAL OF ENGINEERING MATHEMATICS; p. 1-31, doi: 10.1007/s10665-016-9865-7.

Contrafatto L, Cuomo M, GRECO L., Meso-scale simulation of concrete multiaxial behaviour. EUROPEAN JOURNAL OF ENVIRONMENTAL AND CIVIL ENGINEERING; p. 1-16, doi: 10.1080/19648189.2016.1182085.

GRECO L., Giorgio I, Battista A (in press). In plane shear and bending for first gradient inextensible pantographic sheets: numerical study of deformed shapes and global constraint reactions. MATHEMATICS AND MECHANICS OF SOLIDS (MMS), ISSN: 1081-2865, doi: 10.1177/1081286516651324.

Battista A, Rosa L, dell'Erba R, GRECO L. (in press). Numerical investigation of a particle system compared with first and second gradient continua: Deformation and fracture phenomena. MATHEMATICS AND MECHANICS OF SOLIDS (MMS), ISSN: 1081-2865, doi: 10.1177/1081286516657889.

GRECO L., Cuomo M (2016). An isogeometric implicit G1 mixed finite element for Kirchhoff space rods. *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING (CMAME)*, vol. 298; p. 325-349, ISSN: 0045-7825, doi: 10.1016/j.cma.2015.06.014.

Cuomo M, dell'Isola F, GRECO L. (2016). Simplified analysis of a generalized bias test for fabrics with two families of inextensible fibres. *ZEITSCHRIFT FUR ANGEWANDTE MATHEMATIK UND PHYSIK (ZAMP)*, vol. 67, ISSN: 0044-2275, doi: 10.1007/s00033-016-0653-z.

Placidi L, GRECO L., Bucci S, Turco E, Rizzi N L (2016). A second gradient formulation for a 2D fabric sheet with inextensible fibres. *ZEITSCHRIFT FUR ANGEWANDTE MATHEMATIK UND PHYSIK (ZAMP)*, vol. 67, ISSN: 0044-2275, doi: 10.1007/s00033-016-0701-8.

Dell'Isola F, Della Corte A, GRECO L., Luongo A (2016). Plane bias extension test for a continuum with two inextensible families of fibers: A variational treatment with Lagrange multipliers and a perturbation solution. *INTERNATIONAL JOURNAL OF SOLIDS AND STRUCTURES (IJSS)*, vol. 81; p. 1-12, ISSN: 0020-7683, doi: 10.1016/j.ijsolstr.2015.08.029.

dell'Isola F, Lekszycki T, Pawlikowski M, Grygoruk R, GRECO L. (2015). Designing a light fabric metamaterial being highly macroscopically tough under directional extension: first experimental evidence. *ZEITSCHRIFT FUR ANGEWANDTE MATHEMATIK UND PHYSIK (ZAMP)*, vol. 66; p. 3473-3498, ISSN: 0044-2275, doi: 10.1007/s00033-015-0556-4.

Madeo A, Corte A, GRECO L., Neff P (2015). Wave propagation in pantographic 2D lattices with internal discontinuities. *PROCEEDINGS OF THE ESTONIAN ACADEMY OF SCIENCES*, vol. 64; p. 325-330, ISSN: 1736-6046, doi: 10.3176/proc.2015.3S.01.

d'Agostino M V, Giorgio I, GRECO L., Madeo A, Boisse P (2015). Continuum and discrete models for structures including (quasi-)inextensible elasticae with a view to the design and modeling of composite reinforcements. *INTERNATIONAL JOURNAL OF SOLIDS AND STRUCTURES (IJSS)*, vol. 59; p. 1-17, ISSN: 0020-7683, doi: 10.1016/j.ijsolstr.2014.12.014.

GRECO L., Impollonia N, Cuomo M (2014). A procedure for the static analysis of cable structures following elastic catenary theory. *INTERNATIONAL JOURNAL OF SOLIDS AND STRUCTURES (IJSS)*, vol. 51; p. 1521-1533, ISSN: 0020-7683, doi: 10.1016/j.ijsolstr.2014.01.001.

Contrafatto L, Cuomo M, GRECO L. (2014). A variational model based on isogeometric interpolation for the analysis of cracked bodies. *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCE (IJES)*, vol. 80; p. 173-188, ISSN: 0020-7225, doi: 10.1016/j.ijengsci.2014.02.017.

GRECO L., Cuomo M (2014). An implicit G1 multi patch B-spline interpolation for Kirchhoff-Love space rod. *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING (CMAME)*, vol. 269; p. 173-197, ISSN: 0045-7825, doi: 10.1016/j.cma.2013.09.018.

GRECO L., Cuomo M (2014). Consistent tangent operator for an exact Kirchhoff rod model. *CONTINUUM MECHANICS AND THERMODYNAMICS (CMAT)*, vol. 27; p. 861-877, ISSN: 0935-1175, doi: 10.1007/s00161-014-0361-x.

GRECO L., Cuomo M (2013). B-Spline interpolation of Kirchhoff-Love space rods. *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING (CMAME)*, vol. 256; p. 251-269, ISSN: 0045-7825, doi: 10.1016/j.cma.2012.11.017.

GRECO L., Cuomo M (2012). On the force density method for slack cable nets. *INTERNATIONAL JOURNAL OF SOLIDS AND STRUCTURES (IJSS)*, vol. 49; p. 1526-1540, ISSN: 0020-7683, doi: 10.1016/j.ijsolstr.2012.02.031.

### **International conference proceedings:**

GRECO L., Cuomo M, Impollonia N (2013). An unlocked implicit G1 continuity multi patch B-spline interpolation for the analysis of 3D kirchhoff-love rod elements. In: *SEECMMIII - 3th South-East European Conference on Computational Mechanics an ECCOMAS and IACM Special Interest Conference*. Kos island - Greece, 12-14 June 2013, p. 268-277.

GRECO L. (2012). Multi-Patch Isogeometric Analysis of space Rods. In: *YIC2012, Proceedings of the First ECCOMAS Young Investigators Conference on Computational Methods in Applied Sciences*, ISBN/ISSN: 978-972-99784-2-5.

GRECO L., Cuomo M (2012). Multi-Patch Isogeometric Analysis of space Rods. In: *Proceedings of the Eleventh International Conference on Computational Structures Technology (Civil-Comp Press,2012)*. Dubrovnik, 4-7 Settembre 2012. B.H.V. Topping, ISBN/ISSN: 978-1-905088-54-6, doi: 10.4203/ccp.99.222.

GRECO L., Cuomo M (2012). Isogeometric analysis of space rods: considerations on stress Locking. In: *proceedings of the 6th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS2012)*. Vienna (Austria), 10-14 september 2012, Vienna: J. Eberhardsteiner et.al. (eds.), p. 5094-5112, ISBN/ISSN: 978-3-9502481-9-7.

### **National conference proceedings:**

GRECO L., FAZIO B.O., DELLA CORTE A., CUOMO M., (2015) Isogeometric discrete Ricci flow regularization of isoperimetric problems. In: *proceedings of the XXII Meeting Italian Association of Theoretical and Applied Mechanic, AIMETA 2015*, 14-17 September 2015, Genova, ISBN: 978-88-97752-52-3.

GRECO L., CUOMO M., (2014) Consistent tangent operator for an exact Kirchhoff rod model. In: *proceedings of the XX National Meeting of Computational Mechanics, VII Riunione del Gruppo Materiali AIMETA, GIMC-GMA2014*, 11-13 June 2014, Cassino. (pag.91).

GRECO L., CUOMO M., (2014) An implicit G1-continuity interpolation for Kirchhoff plate elements. In: *proceeding of the XX Italian Meeting of Computational Mechanics, VII Riunione del Gruppo Materiali AIMETA, GIMC-GMA2014*, 11-13 June 2014, Cassino. (pag.92).

CUOMO M., GRECO L. (2013) Isogeometric algorithm for crack tracking in plane problems. In: *proceeding of the XXI Italian Meeting of Theoretical and Applied Mechanics (AIMETA2013)*, 17-20 Septmber 2013, Torino.

GRECO L., CUOMO M., (2013) A locking-free multi patch B-Spline element for the analysis of curved 3D rod elements. In: proceeding of the XXI Italian Meeting of Theoretical and Applied Mechanics (AIMETA2013), 17-20 September 2013, Torino.

GRECO L., CUOMO M., (2012) Convergence analysis and stress locking of isogeometric formulations for space rods. XIX Italian Meeting of Computational Mechanics (GIMC2012), 25-27 June 2012, Rossano Calabro. (Online Proceedings ISBN 978-88-907488-0-6).

GRECO L., CUOMO M., IMPOLLONIA N., (2011) Incremental analysis of cable nets. In: proceeding of the XX Italian Meeting of Theoretical and Applied Mechanics (AIMETA2011), 12-15 September 2011, Bologna. (Book of Abstracts ISBN 978-88-906340-0-0, Online Proceedings ISBN 978-88-906340-1-7).

GRECO L., CUOMO M., (2011) Isogeometric analysis of space rods. In: proceedings of the XX Meeting of Theoretical and Applied Mechanics (AIMETA2011), 11-15 September 2011, Bologna. (Book of Abstracts ISBN 978-88-906340-0-0, Online Proceedings ISBN 978-88-906340-1-7).

GRECO L., FAZIO O.B., MASSIMO CUOMO (2010). On the force density method for slack cable nets. In: GIMC 2010 – XVIII Italian Meeting of Computational Mechanics. Siracusa, 22-24 September 2010, ISBN/ISSN: 978-88-905217-0-6.

CUOMO M., GRECO L. (2009). Influence of wrinkling in the structural response of light membranes. In: proceedings of the XIX Italian Meeting of Theoretical and Applied Mechanics, AIMETA. Ancona, 14-17 September 2009, ANCONA: Aras Edizioni, p. 361, (ISBN/ISSN: 9788896378083).

CUOMO M, GRECO L. (2009). A finite element cable for the analysis of cable nets. In: proceedings of the XIX Italian Meeting of Theoretical and Applied Mechanics, AIMETA. Ancona, 14-17 September 2009, ANCONA: Aras Edizioni, p. 395, ISBN/ISSN: 9788896378083.

GRECO L., LEOPOLDO GRECO (2007). Wrinkling in membrane structures with strong surface curvature. In: proceedings of the XVIII Italian Meeting of Theoretical and Applied Mechanics, AIMETA. brescia, 14 September 2007, BRESCIA: Starrylink, p. 354, ISBN/ISSN: 918-88-89720-69-1.