



UNIVERSITÀ DEGLI STUDI DELL'AQUILA
Prof. Francesco D'Annibale
Curriculum scientifico

(Aggiornato il 2022/11/25)

PERSONAL INFORMATION

- *First Name:* Francesco
- *Surname:* D'Annibale
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- *Address:* Piazzale Pontieri 1, Monteluco di Roio, 67100 L'Aquila, Italy
- *Department:* DICEAA and M&MoCS
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POSITIONS

- *2010-2014: **Post-Doc*** at Dipartimento di Ingegneria Civile, Edile-Architettura e Ambientale (DICEAA). Title of the Research: Danneggiamento a fatica di strutture multistrato (Fatigue damage in multi-layered structures).
- *2014-2016: **Post-Doc*** at International Research Center on Mathematics and Mechanics of Complex System (M&MoCS), University of L'Aquila. Title of the Research: Dinamica e stabilità di sistemi Piezo-Elettro-Meccanici (PEM) sollecitati da azioni non conservative (Dynamics and stability of Piezo-Electro-Mechanical(PEM) systems under nonconservative actions).
- *2016-2019: **Researcher*** at Dipartimento di Ingegneria Civile, Edile-Architettura e Ambientale

(DICEAA) and International Research Center on Mathematics and Mechanics of Complex Systems (M&MoCS), University of L'Aquila.

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2019-2021: Associate Professor in Solids and Structural Mechanics (SSD ICAR/08 - Scienza delle Costruzioni) at Dipartimento di Ingegneria Civile, Edile-Architettura e Ambientale (DICEAA), University of L'Aquila.

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2021-Present: Full Professor in Solids and Structural Mechanics (SSD ICAR/08 - Scienza delle Costruzioni) at Dipartimento di Ingegneria Civile, Edile-Architettura e Ambientale (DICEAA), University of L'Aquila.

ACADEMIC RESPONSIBILITIES

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2016-2020: Member of the Executive Committee of M&MoCS, University of L'Aquila.

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2017-Present: Member of the Teaching Staff in the doctoral school of Civil, Construction-Architectural and Environmental Engineering, University of L'Aquila.

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2018-Present: President of the Administrative Board of the Academic Spin-off Diagnostic, Retrofitting, Innovation in Materials and Structures (DRIMS), University of L'Aquila

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2018-Present: Director of the Laboratory of innovative materials for construction of DICEAA, University of L'Aquila.

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2022-Present: Programme Coordinator of Bachelor in Civil and Environmental Engineering and Master in Civil Engineering of DICEAA, University of L'Aquila.

RESEARCH FIELDS

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Linear and nonlinear oscillations of one-dimensional, elastic, structural systems

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Passive control of elastic systems via added piezoelectric devices

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Stability and nonlinear oscillations of elastic systems under conservative and nonconservative loads

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Perturbation methods for multiple-bifurcations analysis of multi-parameter dynamical systems

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Local and nonlocal damage constitutive models

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Fatigue damage and wear constitutive modeling for multi-layered structures

- Dynamic approach and numerical algorithms within the framework of the Generalized Beam Theory
 - Homogenization of beam-like structures
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PUBLICATIONS

Peer-Reviewed Journal Articles

- Ciallella, A., Pasquali, D., D'Annibale, F., Giorgio, I. (2022). Shear rupture mechanism and dissipation phenomena in bias-extension test of pantographic sheets: Numerical modeling and experiments. *Mathematics and Mechanics of Solids*, 27(10), 2170-2188, doi: [10.1177/10812865221](https://doi.org/10.1177/10812865221).
- Casalotti, A., D'Annibale, F. (2022). On the effects of a beam-like piezoelectric passive controller on the linear stability of the visco-elastic Beck's beam. *Mechanics Research Communications*, 125, Article number 103980, doi: [10.1016/j.mechrescom.2022.103980](https://doi.org/10.1016/j.mechrescom.2022.103980).
- Casalotti, A., D'Annibale, F. (2022). On the effectiveness of a rod-like distributed piezoelectric controller in preventing the Hopf bifurcation of the visco-elastic Beck's beam. *Acta Mechanica*, 233, 1819-1836, doi: [10.1007/s00707-022-03185-8](https://doi.org/10.1007/s00707-022-03185-8).
- Casalotti, A., D'Annibale, F. (2021). A rod-like piezoelectric controller for the improvement of the visco-elastic Beck's beam linear stability, *Structural Control and Health Monitoring*, e2865, doi: [10.1002/stc.2865](https://doi.org/10.1002/stc.2865).
- Ciallella, A., Pasquali, D., Gołaszewski, M., D'Annibale, F., Giorgio, I. (2021). A rate-independent internal friction to describe the hysteretic behavior of pantographic structures under cyclic loads, *Mechanics Research Communications*, 116, 103761, doi: [10.1016/j.mechrescom.2021.103761](https://doi.org/10.1016/j.mechrescom.2021.103761).
- Luongo, A., D'Annibale, F., Ferretti, M. (2020). Shear and flexural factors for static analysis of homogenized beam models of planar frames, *Engineering Structures*, 228, 111440, doi: [10.1016/j.engstruct.2020.111440](https://doi.org/10.1016/j.engstruct.2020.111440).
- D'Annibale, F., Casalotti, A., (2020). Stick-slip and wear phenomena at the contact interface between an elastic beam and a rigid substrate, *Mathematics and Mechanics of Solids*, in press.
- Casalotti, A., D'Annibale, F., Rosi, G. (2020). Multi-scale design of an architected composite structure with optimized graded properties, *Composite Structures*, 252, art. no. 112608, doi: [10.1016/j.compstruct.2020.112608](https://doi.org/10.1016/j.compstruct.2020.112608).
- Ferretti, M., D'Annibale, F., Luongo, A. (2020). Modeling beam-like planar structures by a one-dimensional continuum: an analytical-numerical method, *Journal of Applied and Computational Mechanics*, doi: [10.22055/jacm.2020.33100.2150](https://doi.org/10.22055/jacm.2020.33100.2150).
- Casalotti, A., D'Annibale, F. (2020) Improving the linear stability of the visco-elastic Beck's beam via piezoelectric controllers, *Journal of Applied and Computational Mechanics*, doi: [10.22055/jacm.2020.33648.2260](https://doi.org/10.22055/jacm.2020.33648.2260).

- D'Annibale, F., Ferretti, M. (2020). On the effects of linear damping on the nonlinear Ziegler's column, *Nonlinear Dynamics*, 1-16, doi: [10.1007/s11071-020-05797-y](https://doi.org/10.1007/s11071-020-05797-y).
- Ferretti, M., D'Annibale, F., Luongo, A. (2020). Buckling of tower buildings on elastic foundation under compressive tip forces and self-weight, *Continuum Mechanics and Thermodynamics*, 1-21, doi: [10.1007/s00161-020-00911-2](https://doi.org/10.1007/s00161-020-00911-2).
- D'Annibale, F., Ferretti, M., Luongo, A. (2020). Static and Dynamic Responses of Micro-Structured Beams, *Applied Sciences*, 10(19), 6836, doi: [10.3390/app10196836](https://doi.org/10.3390/app10196836).
- Ferretti, M., D'Annibale, F. (2020). Buckling of Planar Micro-Structured Beams, *Applied Sciences*, 10 (18), 6506, doi: [10.3390/app10186506](https://doi.org/10.3390/app10186506).
- Luongo, A., D'Annibale, F. (2020). Modeling the linear dynamics of continuous viscoelastic systems on their infinite-dimensional central subspace, *Mathematics and Mechanics of Complex Systems*, 8(2), 127-151, doi: [10.2140/memocs.2020.8.127](https://doi.org/10.2140/memocs.2020.8.127).
- dell'Isola, F., Seppecher, P., Spagnuolo, M. et al. (2019). Advances in pantographic structures: design, manufacturing, models, experiments and image analyses, *Continuum Mechanics and Thermodynamics*, 31(4), 1231-1282, doi: [10.1007/s00161-019-00806-x](https://doi.org/10.1007/s00161-019-00806-x).
- D'Annibale, F., Ferretti, M., Luongo, A. (2019). Shear-shear-torsional homogenous beam models for nonlinear periodic beam-like structures, *Engineering Structures*, 184, 115-133, doi: [10.1016/j.engstruct.2019.01.039](https://doi.org/10.1016/j.engstruct.2019.01.039).
- De Angelo, M., Spagnuolo, M., D'Annibale, F., Pfaff, K., Hoschke, K., Misra, A., Dupuy, C., Peyre, P., Dirrenberger, J., Pawlikowski, M., (2019). The macroscopic behavior of pantographic sheets depends mainly on their microstructure: experimental evidence and qualitative analysis of damage in metallic specimens, *Continuum Mechanics and Thermodynamics*, 31, 1181-1203, doi: [10.1007/s00161-019-00757-3](https://doi.org/10.1007/s00161-019-00757-3).
- Di Nino, S., D'Annibale, F., Luongo, A. (2017). A simple model for damage analysis of a frame-masonry shear-wall system, *International Journal of Solids and Structures*, 118, 119-134, doi: [10.1016/j.ijsolstr.2017.09.007](https://doi.org/10.1016/j.ijsolstr.2017.09.007).
- Luongo, A., D'Annibale, F. (2017). Invariant subspace reduction for linear dynamic analysis of finite-dimensional viscoelastic structures, *Meccanica*, 52(13), 3061-3085, doi: [10.1007/s11012-017-0741-y](https://doi.org/10.1007/s11012-017-0741-y).
- Ferretti, M., D'Annibale, F., Luongo, A. (2017). Flexural-torsional flutter and buckling of braced foil beams under a follower force, *Mathematical Problems in Engineering*, art. no. 2691963, doi: [10.1155/2017/2691963](https://doi.org/10.1155/2017/2691963).
- Turco, E., Golaszewski, M., Giorgio, I., D'Annibale, F. (2017). Pantographic lattices with non-

orthogonal fibres: Experiments and their numerical simulations, *Composites Part B: Engineering*, 118, 1-14, doi: [10.1016/j.compositesb.2017.02.039](https://doi.org/10.1016/j.compositesb.2017.02.039).

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D'Annibale, F. (2016). Piezoelectric control of the Hopf bifurcation of Ziegler's column with nonlinear damping, *Nonlinear Dynamics*, 86(4), 2179-2192, doi: [10.1007/s11071-016-2866-2](https://doi.org/10.1007/s11071-016-2866-2).

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Luongo, A., D'Annibale, F., Ferretti, M. (2016). Hard loss of stability of Ziegler's column with nonlinear damping, *Meccanica*, 51(11), 2647-2663, doi: [10.1007/s11012-016-0471-6](https://doi.org/10.1007/s11012-016-0471-6).

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D'Annibale, F., Ferretti, M., Luongo, A. (2016). Improving the linear stability of the Beck's beam by added dashpots, *International Journal of Mechanical Sciences*, 110, 151-159, doi: [10.1016/j.ijmecsci.2016.03.008](https://doi.org/10.1016/j.ijmecsci.2016.03.008).

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Luongo, A., D'Annibale, F. (2016). Nonlinear hysteretic damping effects on the post-critical behaviour of the visco-elastic Beck's beam, *Mathematics and Mechanics of Solids*, 22(6), 1347-1365, doi: [10.1177/1081286516632381](https://doi.org/10.1177/1081286516632381).

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Luongo, A., Ferretti, M., D'Annibale, F. (2016). Paradoxes in dynamic stability of mechanical systems: investigating the causes and detecting the nonlinear behaviors, *SpringerPlus*, 5(60), doi: [10.1186/s40064-016-1684-9](https://doi.org/10.1186/s40064-016-1684-9).

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D'Annibale, F., Rosi, G., Luongo, A. (2016). Piezoelectric control of Hopf bifurcations: a nonlinear discrete case study, *International Journal of Non-Linear Mechanics*, 80, 160-169, doi: [10.1016/j.ijnonlinmec.2015.09.012](https://doi.org/10.1016/j.ijnonlinmec.2015.09.012).

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D'Annibale, F., Rosi, G., Luongo, A. (2015). Controlling the Limit-Cycle of the Ziegler Column via a Tuned Piezoelectric Damper, *Mathematical Problems in Engineering*, vol. 2015, Article ID 942859, 9 pages, doi: [10.1155/2015/942859](https://doi.org/10.1155/2015/942859).

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Taig, G., Ranzi, G., D'Annibale, F. (2015). An unconstrained dynamic approach for the Generalised Beam Theory, *Continuum Mechanics and Thermodynamics*, 27(4), 879-904, doi: [10.1007/s00161-014-0358-5](https://doi.org/10.1007/s00161-014-0358-5).

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D'Annibale, F., Rosi, G., Luongo, A. (2014). On the failure of the 'Similar Piezoelectric Control' in preventing loss of stability by nonconservative positional forces, *Zeitschrift für Angewandte Mathematik und Physik*, 66(4), 1949-1968, doi: [10.1007/s00033-014-0477-7](https://doi.org/10.1007/s00033-014-0477-7).

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D'Annibale, F., Rosi, G., Luongo, A. (2014). Linear stability of piezoelectric-controlled discrete mechanical systems under nonconservative positional forces, *Meccanica*, 50(3), 825-839, doi: [10.1007/s11012-014-0037-4](https://doi.org/10.1007/s11012-014-0037-4).

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Luongo, A., D'Annibale, F. (2014). On the destabilizing effect of damping on discrete and continuous circulatory systems, *Journal of Sound and Vibration*, 333(24), 6723-6741, doi: [10.1016/j.jsv.2014.07.030](https://doi.org/10.1016/j.jsv.2014.07.030).

- Luongo, A., D'Annibale, F. (2014). A paradigmatic minimal system to explain the Ziegler paradox, *Continuum Mechanics and Thermodynamics*, 27(1-2), 211-222, doi: [10.1007/s00161-014-0363-8](https://doi.org/10.1007/s00161-014-0363-8).
- Piccardo, G., D'Annibale, F., Zulli, D. (2014). On the contribution of Angelo Luongo to Mechanics: in honour of his 60th Birthday, *Continuum Mechanics and Thermodynamics*, 27(4), 507-529, doi: [10.1007/s00161-014-0388-z](https://doi.org/10.1007/s00161-014-0388-z).
- Luongo, A., D'Annibale, F. (2013). Double zero bifurcation of non-linear viscoelastic beams under conservative and non-conservative loads, *International Journal of Non-Linear Mechanics*, 55, 128-139, doi: [10.1016/j.ijnonlinmec.2013.05.007](https://doi.org/10.1016/j.ijnonlinmec.2013.05.007).
- D'Annibale, F., Luongo, A. (2013). A damage constitutive model for sliding friction coupled to wear, *Continuum Mechanics and Thermodynamics*, 25(2-4), 503-522, doi: [10.1007/s00161-012-0283-4](https://doi.org/10.1007/s00161-012-0283-4).
- Luongo, A., D'Annibale, F. (2012). Bifurcation analysis of damped visco-elastic planar beams under simultaneous gravitational and follower forces, *International Journal of Modern Physics B*, 26(25), art. no. 1246015, doi: [10.1142/S0217979212460150](https://doi.org/10.1142/S0217979212460150).
- Luongo, A., D'Annibale, F. (2011) Linear stability analysis of multiparameter dynamical systems via a numerical-perturbation approach, *AIAA Journal*, 49(9), 2047-2056, doi: [10.2514/1.J051023](https://doi.org/10.2514/1.J051023).

Ph.D. Thesis

- D'Annibale, F., (2010). Modelli costitutivi ed analisi di strutture soggette a danno ed usura per contatto quasi-statico (Constitutive models and analysis of structures subjected to damage and wear due to quasi-static friction contact), *Università degli Studi dell'Aquila*

Book Chapters

- Luongo, A., D'Annibale, F. (2015). Linear and nonlinear damping effects on the stability of the Ziegler column, in Belhaq, Mohamed (Editor), Springer Proceedings in Physics Vol. 168: *Structural Nonlinear Dynamics and Diagnosis*, Springer International Publishing Switzerland, ISBN: 978-3-319-19850-7, doi: [10.1007/978-3-319-19851-4](https://doi.org/10.1007/978-3-319-19851-4)

PARTICIPATION IN RESEARCH PROJECTS

- PRIN 2007, Title of the project: *Modelli analitici e sperimentali per l'analisi dinamica e di stabilità delle strutture nonlineari*, Scientific Coordinator: Prof. Fabrizio Vestroni, Financed by the Italian Ministry of Education, University and Research.

- PRIN10-11, Title of the project: *Dinamica stabilità e controllo di strutture flessibili*
ScientificCoordinator: Prof. Angelo Luongo, Financed by the Italian Ministry of Education,
University and Research.
-

PARTICIPATION IN RESEARCH GROUPS

- Member of M&MoCS, University of L'Aquila.
 - Member of the Laboratoire International Associé Coss&Vita, established by the laboratories of the Fédération Francilienne de Mécanique, Matériaux, Structures et Procédés (F2M) and of the M&MoCS, University of L'Aquila.
 - Coordinator of the research group Non-linearity and Stability in Continuous Media (NLS), Laboratoire International Associé Coss&Vita.
 - PRIN10-11, Title of the project: *Dinamica stabilità e controllo di strutture flessibili*
ScientificCoordinator: Prof. Angelo Luongo, Financed by the Italian Ministry of Education,
University and Research.
-

VISITING PROFESSOR/RESEARCHER

- Visiting Researcher, School of Civil Engineering, The University of Sydney, 2013.
 - Visiting Professor, Faculty of Production Engineering - Warsaw University of Technology, 2018.
 - Visiting Professor, Faculté de Sciences et Technologie - Laboratoire de Modélisation et Simulation Multi Echelle - Université Paris Est Créteil Val de Marne (UPEC), 2018, 2019, 2022.
-

EDITORIAL POSITIONS

- Associate Editor of CivilEng - MDPI.
- Editor of Research on Engineering Structures & Materials - MIM Research Group.
- Member of the Editorial Board of the American Journal of Mechanical and Industrial Engineering, Science Publishing Group.
- Editor of the S.I. 'Nonlinearities, Bifurcation and Instabilities', Continuum Mechanics and

Thermodynamics, 27(4-5), 2015.

•

Editor of the S.I. 'Homogenization Methods in Materials and Structures', Applied Sciences - MDPI, 2020.

REVIEWER FOR INTERNATIONAL JOURNALS

- Nonlinear Dynamics
- International Journal of Non-Linear Mechanics
- Archive of Applied Mechanics
- Meccanica
- Mathematics and Mechanics of Solids
- Continuum Mechanics and Thermodynamics
- Shock and Vibration
- International Journal of Mechanical Sciences
- Mathematical Reviews
- Mechanics Research Communications
- Mechanical Systems and Signal Processing
- European Journal of Mechanics / A Solids