

Giacomo Moretti

Marie Skłodowska-Curie research fellow at Saarland University

Education

- May 2017 **PhD in Emerging Technologies**, *TeCip Institute, Scuola Superiore Sant'Anna, Pisa.*
- Dec. 2014 **Engineering Diploma**, *Scuola Superiore Sant'Anna (superior graduate school), Pisa.*
- Oct. 2013 **Master's degree in Energy Engineering**, *University of Pisa.*

Experience and positions

- Nov 2020 – now **Marie Skłodowska-Curie European research fellow**, *Intelligent Material Systems Laboratory, Saarland University, Saarbrücken (DE).*
Project title: DEtune - Towards a new generation of soft and conformable acoustic devices based on electroactive polymers
- Oct 2017 – Sep 2020 **Visiting research fellow**, *Department of Industrial engineering, University of Trento (IT).*
- May 2017 – Nov 2020 **Post-doctoral research fellow**, *TeCip Institute, Scuola Superiore Sant'Anna, Pisa (IT).*
- Feb. – Jul. 2016 **Visiting PhD student**, *Institute for Energy Systems, University of Edinburgh (UK).*
- Nov. 2013 – May 2017 **PhD Candidate**, *TeCip Institute, Scuola Superiore Sant'Anna, Pisa (IT).*
Research project: Modelling and assessment of ocean wave energy converters based on dielectric elastomer generators
- Aug. – Sep. 2012 **Research intern**, *Fermi National Particles Accelerator Laboratory (Fermilab), Batavia, Illinois (US).*

Academic profile

Research Interests Smart Transducers, Multifunctional Materials, Sound and Vibrations, Energy Harvesting, Renewable Energy.

- Research projects (lead roles)
- **Forschungspreis MINT** (Stiftung ME Saar) - Development of the test-bench infrastructure for the characterisation of a new class of fully polymeric acoustic devices based on dielectric elastomers, Mar. 2020-now. [PI](#)
 - **DEtune**, H2020 Marie Skłodowska-Curie Individual European Fellowship, Nov. 2020 - now. [beneficiary and proponent](#)
 - **Wave Energy Scotland - Control programme**, Control of Dielectric Elastomer Generators, Oct. 2017 - Feb. 2018. [Co-PI](#)

- Research projects (participation) ○ **Mu2e experiment at Fermilab**, Aug.-Sep. 2012
- **PolyWEC**, FET-7 EU project, Feb. 2013 - Jan. 2017
- **Wave Energy Scotland - PTO programme**, Direct Contact Dielectric Elastomer Generator, Nov. 2015 - Jan. 2018
- **WetFeet**, H2020 EU project, Jun. 2015 - Jun. 2018
- **Eolo**, Tuscany Region project, Jun. 2017 - Jun. 2019
- Teaching and mentoring ○ Lectures in non-linear elasticity, dielectric elastomer transducers, hydraulic and pneumatic drives for the Course in **Mechanics of Transducers**, MSc degree in Mechanical/Mechatronics Engineering, University of Pisa, (2013-2017) and University of Trento (2017-2021).
- Lectures for the course in **Thermodynamics**, MSc in Systems Engineering, Saarland University (2021).
- Teacher for the course in **Applied Mechanics 1**, Superior technical qualification course for Mechatronic Technicians, ITT G. Marconi, Rovereto, Trento (2020).
- External **referee** for an EngD (Engineering Doctorate) at the University of Edinburgh. Candidate: Anthony McDonald (Sept. 2020)
- **Co-advisor** for BSc and MSc theses of approx. 15 students for the course in Mechanical/Industrial/Civil Engineering in the Universities of Trento and Reggio Calabria.
- Technology transfer ○ Shareholder at Cheros Srl, spin-out company of Scuola Sant'Anna, Pisa (IT)
- Co-author of the following patents:
1. Cherubini A., **Moretti G.**, Fontana M. *Aircraft System with High-Altitude Wind Capture for Wind Generator*. WO2019053755 (A1)
 2. Fontana M., Daniele L., **Moretti G.**, Damiani F., Righi M., Vertechy R., Teillant B., Vicente M., Sarmiento A., Forehand D., Ingram D. *Wave Motion Generator Based on a Dielectric Elastomer with Stiffness Compensation*. WO2018116276 (A1)
- Editorial roles ○ **Topic Editor** for MDPI Actuators. **Co-guest editor** for the special issue 'Smart Dielectric Elastomer Actuator Systems'.
- **Co-guest editor** for the special issue 'Novel Sustainable Cooperative Systems' on Frontiers in Robotics and AI
- **Reviewer Editor** for Frontiers in Robotics and AI (topic: Soft Robotics).
- **Referee** for several leading journals in the fields of Mechatronics, Robotics, and Energy, e.g.: Smart Mater Struct; IEEE T Mech.; IEEE T Contr Syst T.; Ocean Eng; Sensor Actuat A-Phys. Publons ID: 1319376
- Selected talks and presentations ○ Talks/presentations in 20+ international events. A list of selected presentations is reported in the following:
- [1] *Modeling of an Oscillating Wave Surge Energy Converter with Dielectric Elastomer Power Take-Off* ASME OMAE Conference 2014, San Francisco, USA.
 - [2] *Experimental Characterization of Coiled Polymeric-Wire Actuators*, BAMN Conference 2015, Vancouver, Canada.
 - [3] *Analysis of Dielectric Fluid Transducers*, SPIE Smart Structures + Nondestructive Evaluation 2018, Denver, USA.
 - [4] *Lifetime performance of a styrenic rubber membrane for Dielectric Elastomer Transducers*, ASME SMASIS 2018 Conference, San Antonio, USA - **invited paper presentation**.
 - [5] *Steady-state optimisation of periodic systems based on Fourier analysis*. NODY-CON Conference 2019, Rome, Italy.

- Other
- **Member of INORE**, the International Network of Offshore Renewable Energy. Invited panellist (on behalf of Cheros Srl) at INORE European Symposium 2018 (Scotland).
 - Author of **30+ publications** in ISI journals and conference proceedings. A complete list is attached.

Saarbrücken, April 20, 2021

List of Publications

As of April 20, 2021, Giacomo Moretti has an H-index of 12 according to Scopus and 12 according to Google Scholar. His articles received 347 citations according to Scopus, and 447 citations according to Google Scholar.

1 Journal articles

- [J1] Sirbu I. D., **Moretti G.**, Bortolotti G., Bolignari M., Dir S., Fambri L., Vertechy R., Fontana M. (2021) *Electrostatic bellow muscle actuators and energy harvesters that stack up*. Science Robotics, 6(51)
- [J2] **Moretti G.**, Scialò A., Malara G. , Muscolo G. G., Arena F., Vertechy R., Fontana M. (2021) *Hardware-in-the-loop Simulation of Wave Energy Converters based on Dielectric Elastomer Generators*. Meccanica.
- [J3] **Moretti G.**, Zaccarian L., Blanchini F. (2021) *Quadratic constrained periodic optimisation for bandlimited linear systems via the Fourier-based method*. ASME Journal of Dynamic Systems, Measurement and Control, 143(6): 061005.
- [J4] **Moretti G.**, Rosset S., Vertechy R., Anderson I., Fontana M. (2020), *A Review of Dielectric Elastomer Generator Systems*. Advanced Intelligent Systems, 2(10).
- [J5] **Moretti G.**, Sarina L., Agostini L., Vertechy R., Berselli G., Fontana M, *Styrenic-Rubber Dielectric Elastomer Actuator with Inherent Stiffness Compensation*. Actuators, MDPI 9(2).
- [J6] Milazzo M., **Moretti G.**, Burchianti A., Mazzini D., Oddo C. M., Stefanini C., Fontana M. (2020), *A Passively Regulated Full-Toroidal Continuously Variable Transmission*. Meccanica 55(1).
- [J7] **Moretti G.**, Santos-Herran M., Forehand D., Alves M., Jeffrey H., Vertechy R., Fontana M. (2020) *Advances in the development of dielectric elastomer generators for wave energy conversion*. Renewable and Sustainable Energy Reviews, 117, 109430.
- [J8] **Moretti G.**, Malara G., Scialò A., Daniele L., Fiamma V., Romolo A., Vertechy, R., Fontana, M., Arena, F. (2020). *Modelling and field testing of a U-OWC wave energy converter with dielectric elastomer generator*. Renewable Energy, 146, 628-642.
- [J9] Chen Y., Agostini L., **Moretti G.**, Fontana M., Vertechy R. (2019). *Dielectric Elastomer Materials for Actuation and Energy Harvesting: a Comparison Between Styrenic Rubber, Natural Rubber and Acrylic Elastomer*. Smart Materials and Structures, 28(11).
- [J10] **Moretti G.**, Rosati Papini G. P., Daniele L., Forehand, D., Ingram D., Vertechy R., Fontana M. (2019). *Modelling and Testing of a Wave Energy Converter based on Dielectric Elastomer Generators*. Proceedings of the Royal Society A, 475(2222).
- [J11] Muscolo, G.G., **Moretti G.**, Cannata, G. (2018) *SUAS: A Novel Soft Underwater Artificial Skin with Capacitive Transducers and Hyperelastic Membrane*, Robotica, Cambridge Core, 37(4), 756-777.
- [J12] **Moretti G.**, Rosati Papini G.P., Righi M. , Forehand D. , Ingram D., Vertechy R. , Fontana M. (2018) *Resonant wave energy harvester based on dielectric elastomer generator*, Smart Materials and Structures, 27(3), 035015.
- [J13] Rosati Papini G.P. , **Moretti G.**, Vertechy R. , Fontana M. (2018) *Control of an oscillating water column wave energy converter based on dielectric elastomer generator*, Journal of Nonlinear Dynamics, Springer, 92(2), 181-202.
- [J14] **Moretti G.**, Righi M., Vertechy R., Fontana M. (2017) *Fabrication and test of an inflated circular diaphragm dielectric elastomer generator based on PDMS rubber composite*, Polymers, 9(7), 283.

- [J15] **Moretti G.**, Fontana M., Vertechy R. (2015). *Model-Based Design and Optimization of a Dielectric Elastomer Power Take-Off for Oscillating Wave Surge Energy Converters*. Meccanica, Springer. 50(11), 2797-2813.
- [J16] Cherubini A., **Moretti G.**, Vertechy R., Fontana M., (2015). *Experimental Characterization of Thermally-Activated Artificial Muscles based on Coiled Nylon Fishing Lines*, AIP Advances, 5(6), 067158.
- [J17] **Moretti G.**, Fontana M., Vertechy R. (2015). *Parallelogram-shaped Dielectric Elastomer Generators: Analytical Model and Experimental Validation*, Journal of Intelligent Material Systems and Structures. 26(6), 740-751.
- [J18] Ambrosio G., Buehler M., Coleman R., Evbota D., Lamm M., Lopes M., Miller J., **Moretti G.**, Page T., Tartaglia M. (2014). *Studies on the Magnetic Center of the Mu2e Solenoid System*, IEEE Transactions on Applied Superconductivity, 24(3), 1-4.
- [J19] Ambrosio G., Buehler M., Coleman R., Evbota D., Feher S., Lamm M., Kashikin V., Lopes M., Miller J., **Moretti G.**, Page T., Popp J., Ostojic R., Tartaglia M. (2014). *Tolerance Studies of the Mu2e Solenoid System*, IEEE Transactions on Applied Superconductivity, 24(3), 1-5.

2 Book Chapters

- [B1] Cherubini A., **Moretti G.**, Fontana M. (2018) *Dynamic Modeling of Offshore Airborne Wind Energy Converters*, In Airborne Wind Energy (pp. 137-163). Springer, Singapore.

3 Conference Proceedings

- [C1] **Moretti G.**, Rizzello, G., Fontana, M., Seelecke, S. (2021). A multi-domain dynamical model for cone-shaped dielectric elastomer loudspeakers. In Electroactive Polymer Actuators and Devices (EAPAD) XXIII (Vol. 11587, p. 115871K). International Society for Optics and Photonics.
- [C2] Sirbu, I. D., **Moretti G.**, Dirè, S., Fambri, L., Vertechy, R., Meniglio, D., Fontana, M. (2019). *Electrostatic actuator for tactile display based on hydraulically coupled dielectric fluids and soft structures*. In SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring. International Society for Optics and Photonics.
- [C3] Chen, Y., Agostini, L., **Moretti G.**, Berselli, G., Fontana, M., Vertechy, R. (2019). *Fatigue life performances of silicone elastomer membranes for dielectric elastomer transducers: preliminary results*. In SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring. International Society for Optics and Photonics.
- [C4] Bolignari, M., **Moretti G.**, Fontana, M. (2018) *Design and Experimental Characterisation of a Fluidostatic Transmission for a Rehabilitation Exoskeleton*, Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018).
- [C5] Chen, Y., Agostini L., Fontana M., **Moretti G.**, Vertechy R. (2018). *On the lifetime performance of a styrenic rubber membrane for dielectric elastomer transducers*, SMASIS 2018-8143, Proceedings of the ASME 2018 Conference on Smart Materials, Adaptive Structures and Intelligent Systems.
- [C6] Arena F., Daniele L., Fiamma V., Fontana M., Malara G., **Moretti G.**, Romolo A., Rosati Papini G.P., Scialò A., Vertechy, R. (2018) *Field Experiments on Dielectric Elastomer Generators integrated on a U-OWC Wave Energy Converter*. OMAE 2018-77830, Proceedings of the ASME 2018 Conference on Ocean, Offshore and Arctic Engineering.
- [C7] **Moretti G.**, Duranti M., Righi, M., Vertechy R., Fontana M. (2018) *Analysis of Dielectric Fluid Transducers*. In SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring. International Society for Optics and Photonics.
- [C8] Rosati Papini G. P., **Moretti G.**, Forehand D., Ingram D., Vertechy R., Fontana M. (2017). *Experimental Testing of Dielectric Elastomer Generators for Wave Energy Converters*, European Wave and Tidal Energy Conference Series, 2017.
- [C9] Teillant B., Vicente M., Rosati Papini G.P., **Moretti G.**, Vertechy R., Fontana M., Monk K., and Alves M. (2015). *Techno-Economic Comparison between Air Turbines and Dielectric Elastomer Generators as Power Take Off for Oscillating Water Column Wave Energy Converters*, Proceedings of EWTEC 2014, European Wave and Tidal Energy Conference Series.

- [C10] **Moretti G.**, Rosati Papini G.P., Alves M., Grases M., Vertechy R., Fontana M. (2015), *Analysis and Design of an Oscillating Water Column Wave Energy Converter with Dielectric Elastomer Power Take-Off*, OMAE 2015-42103, Proceedings of the ASME 2015 Conference on Ocean, Offshore and Arctic Engineering.
- [C11] **Moretti G.**, Rosati Papini G.P., Fontana M., Vertechy R. (2015), *Hardware in the Loop Simulation of a Dielectric Elastomer Generator for Oscillating Water Column Wave Energy Converters*, IEEE Oceans'2015 Conference.
- [C12] **Moretti G.**, Cherubini A., Vertechy R., Fontana M. (2015). *Experimental characterization of a new class of polymeric-wire coiled transducers*. In SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring. International Society for Optics and Photonics.
- [C13] **Moretti G.**, Fontana M., Vertechy R. (2014), *Modeling of a Heaving Buoy Wave Energy Converter with Stacked Dielectric Elastomer Generator*, SMASIS 2014-7565 Proceedings of the ASME 2014 Conference on Smart Materials, Adaptive Structures and Intelligent Systems.
- [C14] **Moretti G.**, Forehand D., Vertechy R., Fontana M., Ingram D. (2014). *Modeling of an Oscillating Wave Surge Energy Converter with Dielectric Elastomer Power Take-Off*, OMAE 2014-23559, Proceedings of the ASME 2014 Conference on Ocean, Offshore and Arctic Engineering.
- [C15] Fontana M., **Moretti G.**, Lenzo B., Vertechy R. (2014). *Loading System Mechanism for Dielectric Elastomer Generators with Equi-biaxial State of Deformation*, In SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring. International Society for Optics and Photonics.
- [C16] **Moretti G.**, Fontana M., Vertechy R. (2013). *Modelling and Control of Lozenge Shaped Dielectric Elastomer Generators*, SMASIS 2013-3258, Proceedings of the ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems.

4 PhD Thesis

- [T1] **Moretti G.** (2017). *Dielectric Elastomer Generators for Wave Energy Conversion: a Model-Based Design Approach*. PhD thesis. TeCIP Institute, Scuola Superiore Sant'Anna, Pisa (Italy). Available for download [here](#).