Paul Ducarme

paulducarme@hotmail.com
English (fluent), French (native), Dutch (B2)

paulducarme.com
in/paul-ducarme
github.com/ducarme

Recent working experience

- **Ph.D. candidate at AMOLF and ARCNL** — Amsterdam, Netherlands
  Advisors: Johannes T.B. Overvelde, Martin van Hecke, Bart Weber — *Oct 2021 – Nov 2025*
  Thesis: Harnessing mechanical instabilities for functional structures using nonlinear building blocks
  Focus: nonlinear mechanics, instabilities, ASML collaboration (experimental, computational)
  - Design, fabrication, demonstrations of 'countersnapping' structures
  - Development of a catalog of nonlinear building blocks and designs methods
  - Development of the 'flexel formulation' for robust and fast simulations of highly nonlinear structures; implementation into a publicly available and installable Python library [library link]
  - Design and fabrication of various instability-based architected structures, guided by simulations: *snapping lattices, LCE-actuated snapping devices, pneumatic countersnapping systems, locomotion based on sequential hysteresis*
  - Mentoring Master's students and setting up internship projects
  - Talks at international conferences: *2024 SES* (Hangzhou, China), *2024 Multifunctional Materials and Structures GRS* (Ventura, USA), *Creative Differences Workshop - 2023 Design Biennal* (London, UK), *2023 APS March Meeting* (Las Vegas, USA)
- **Software-hardware test engineer at ASM International** — Almere, Netherlands
  Tasks: software testing, software-hardware integration testing — *Jan 2021 – Oct 2021*
- **Research intern at Any-Shape** — Flemalle, Belgium
  Master's thesis: Quality assessment of highly productive selective laser melting processes — *Feb 2019 – Jun 2019*
  - Fabrication of test samples in 316L and AlSi10Mg using selective laser melting
  - Experimental identification of instabilities (keyhole, Rayleigh-Plateau) that affect part quality

Publications

- **Ducarme P.**, Weber B., van Hecke M., Overvelde J.T.B., Exotic mechanical properties enabled by countersnapping instabilities, PNAS, 2025. [open-access link] [promo movie link]
- **Ducarme P.**, Weber B., van Hecke M., Overvelde J.T.B., Simulating mechanical systems from entities with arbitrarily complex deformation paths, in review. [preprint] [github link]
- Stinissen K., **Ducarme P.**, Gorissen B., Overvelde J.T.B., Functionalities enabled by pneumatic countersnapping instabilities, in preparation.
- Kurt E., **Ducarme P.**, Picella S., Overvelde J.T.B., Heat-induced instabilites in silicone-LCE composite structures for locomotion, in preparation.
- **Ducarme P.**, Koppen S., Overvelde J.T.B., Computation of deformation paths for stimuli-driven nonlinear reconfigurable structures, in preparation.

Scientific outreach & Awards

- Featured on *Veritasium* (20M+ subscribers), discussed and showcased research on countersnapping instabilities. 10M+ views. [video link]
- Created short movie showing countersnapping structures in action. 300k+ views. [video link]
- Designed a hand-actuated soft gripper featured at the *Nemo Science Museum*. [exhibition link]
- Best poster award at *2024 GRC Multifunctional Materials and Structures*.

Previous education

- **Master of Science in mechanical engineering, University of Liege** — Liege, Belgium
  Honors: magna cum laude. Focus: advanced solid mechanics, structural optimization — *Sep 2017 – Feb 2020*
- **Erasmus mundus exchange program, University of Ottawa** — Ottawa, Canada
  As part of M.Sc. studies. Focus: reinforcement learning, mechatronics — *Aug 2018 – Jan 2019*
- **Bachelor of Science in engineering, University of Liege** — Liege, Belgium
  Honors: cum laude. Focus: physics, quantum mechanics, mechanical engineering — *Sep 2014 – Jun 2017*