GIOVANNI CORSI

Curriculum Vitae

EDUCATION

2016-2020 **SISSA - Scuola Internazionale Superiore di Studi Avanzati**

PhD

cum laude · *PhD in Mathematical Analysis, Modelling, and Applications* - Dottorato di ricerca in Analisi Matematica, Modelli e Applicazioni · Trieste, Italy
Thesis: *Fluid structure interaction problems involving thin active shells and microswimmers*
Advisor: Professor Antonio De Simone

2011-2014 **Politecnico di Milano**

M. Sc.

110/110 · *Mechanical Engineering* - Laurea Magistrale in Ingegneria Meccanica · Milan, Italy
Thesis: *Numerical Analysis of the unsteady flow in a turbine stage with non-uniform temperature field at inlet*
Italian title: Analisi numerica del flusso instazionario in uno stadio di turbina assiale in presenza di disuniformità nel campo di temperatura in ingresso.
Advisor: Professor Giacomo Bruno Persico

2008-2011 **Università degli studi di Udine**

B. Sc.

110/110 *cum laude* · *Mechanical Engineering* - Laurea Triennale in Ingegneria Meccanica · Udine, Italy

ACADEMIC APPOINTMENTS

2023–2024 **PostDoc**

Scuola Superiore Sant'Anna - Istituto di BioRobotica

Research contract at Scuola Superiore Sant'Anna, working on mathematical and computational models of Fluid-Structure Interaction problems, with application to the motility of soft robots.
References: Professor Antonio De Simone

2021–2023 **PostDoc**

Sapienza Università di Roma - Dipartimento di Ingegneria Strutturale e Geotecnica

Research contract at Sapienza University of Rome, working on problems of Fluid-Structure Interaction, and on Phase-Field models for problems of fracture in thin structures. Theoretical and numerical work, using the OpenFOAM and FEniCS numerical libraries.
References: Professor Antonino Favata, Professor Stefano Vidoli

2014–2016 **Research contract (Pre-Doc)**

Scuola Internazionale Superiore di Studi Avanzati (SISSA)

Research contract at SISSA *mathLab* for Danieli SpA, an international company in the region. Tasks carried out included development of CFD tools for fluid-structure interaction problems and simulation of industrial flow problems. The numerical tools developed were based on the OpenFOAM numerical library.
References: Professor Gianluigi Rozza

EXPERIENCE ABROAD

Sorbonne Université

January-June 2018, and December 2019 - March 2020

Period of research abroad at the *Institut Jean Le Rond d'Alembert*, Sorbonne Université · Paris, France
Scientific Host: Professor Corrado MAURINI

SOCIETY MEMBERBERSHIPS, AWARDS AND HONORS

2022-2024

Member of the GNFM group, section MECCANICA DEI CONTINUI SOLIDI, of the ISTITUTO NAZIONALE DI ALTA MATEMATICA "FRANCESCO SEVERI" (*INdAM*).

FURTHER TRAINING

1. **Introduction to Scientific and Technical Computing in C**. CINECA HPC Course. March 27-29, 2023 (Online). Coordinators: Luca Ferraro.
2. **Programming paradigms for GPU devices**. CINECA HPC Course. November 29-December 01, 2021 (Online). Coordinators: Luca Ferraro.
3. **Advanced Topics in Computational Mechanics**. International Centre for Mechanical Sciences (CISM) Advanced Webinar. December 07-10, 2020 (Online). Coordinators: Wolfgang A. Wall.
4. **Computational Biomechanics Advanced Models and Methods**. International Centre for Mechanical Sciences (CISM) Advanced Webinar. December 02-04, 2020 (Online). Coordinators: Wolfgang A. Wall and Bernhard A. Schrefler.

RESEARCH ACTIVITIES

Robotics

At the institute of BioRobotics at Scuola Superiore Sant'Anna I've had the opportunity to be part of several joint collaborations with other research groups. I could thus develop a comprehension of research topics such as hand robotics, collaborative robotics, development and implementation of algorithms for direct and inverse control problems.

Fracture Mechanics

Modelling of fracture problems in thin structures (beams, shells), investigating the effects of the coupling of membranal and bending deformations. The study is both numerical, using the Finite Element Method for Phase-Field problems, and theoretical, e.g., using approximation techniques such as matched asymptotic expansion of problems of Linear Elastic Fracture Mechanics.

Micro-Swimmers

Study of the problem of locomotion of bio-inspired objects in a fluid. Experimental, theoretical and numerical modelling of locomotion problems.

Fluid-Structure Interaction

Numerical investigation of problems of buoyancy driven motion of bio-inspired objects (e.g., seeds) and soft robots in a viscous fluid. Problems of interaction of a viscous fluid with thin shells.

SKILLS

Programming Languages

Proficiency in the C, C++, PYTHON programming languages

Numerical Libraries

Extensive experience in using numerical libraries for simulation of problems in the context of continuum mechanics and fluid dynamics, in particular OpenFOAM (finite volumes), FEniCSx (finite elements)

HPC skills

Used HPC resources on various supercomputers at French (Jean-Zay, MeSU), Italian (CINECA and SISSA resources) and Finnish (LUMI-C) institutions, with different architectures.

HPC environments

PBS scheduler, SLURM scheduler

Languages

Italian · Mother tongue

English · Fluent

HPC RESOURCES ALLOCATIONS

2020

Italian SuperComputing Resource Allocation (ISCRA, CINECA), *Application Class C*, Call of May 2020, Project ID - FSThin20. Role: PI
Accepted, core hours awarded: 200k

2021

Italian SuperComputing Resource Allocation (ISCRA, CINECA), *Application Class C*, Call of April 2021, Project ID - MCR-SW21. Role: PI
Accepted, core hours awarded: 60k

2021

Italian SuperComputing Resource Allocation (ISCRA, CINECA), *Application Class B*, Call of June 2021, Project ID - MT-SWS21. Role: PI
Accepted, core hours awarded: 2.4M

2023

EuroHPC (PRACE), *Development Access Call*, Call of June 2023, Project ID - EHPC-DEV-2023D06-027. Role: Team Member
Accepted, core hours awarded: 1.9M

2024

Italian SuperComputing Resource Allocation (ISCRA, CINECA), *Application Class B*, Call of December 2023, Project ID - HSFSI23. Role: Team Member
Accepted, core hours awarded: 3.6M

PRESENTATIONS AT CONFERENCES

15-19 September 2019, Rome, ITALY

Title: A neutrally stable shell in a stokes flow: a rotational taylor's sheet.
AIMETA 2019, Sapienza University of Rome.

04-08 September 2022, Palermo, ITALY

Title: A phase-field model for fracture in beams from asymptotic results in 2D elasticity.
AIMETA Palermo 2022, University of Palermo.

02-06 September 2024, Napoli, ITALY

Title: A numerical study of buoyancy-driven motions of annular disks in a fluid.
AIMETA Napoli 2024, University of Naples - Federico II.

ACTIVITY AS REVIEWER

Reviews for Scientific Journals

1. Engineering with Computers (Springer)
2. Computer Methods in Applied Mechanics and Engineering (Elsevier)

TEACHING ACTIVITY

Examination Board

Appointed *cultore della materia* by the *Dipartimento di Ingegneria Strutturale e Geotecnica* of *Sapienza Università di Roma* on March 1st, 2022, and as such participated in the examination boards for the exams of the following courses (taught by Prof. Antonino Favata):

1. Meccanica delle Strutture, SSD ICAR/08, Laurea Magistrale Architetture
2. Meccanica delle Strutture, SSD ICAR/08, Laurea Triennale Gestione del Processo Edilizio/Project Management

Teaching Assistant

- ANALYSIS OF BIONIC AND ROBOTIC SYSTEMS *Dipartimento di Ingegneria dell'Informazione*, Università di Pisa. Academic year 2023-2024 (∼20 students). Language: English. **Bando DINGI 2023/12-3 Didattica Sussidiaria.**

SCIENTIFIC PUBLICATIONS

Contribution in Conference proceedings

1. Giovanni Corsi, Antonino Favata, and Stefano Vidoli. **A phase-field model for fracture in beams from asymptotic results in 2D elasticity**. Materials Research Proceedings 26, 2023. https://doi.org/10.21741/9781644902431-19
2. Filippo Salmoiraghi, Francesco Ballarin, Giovanni Corsi, Andrea Mola, Marco Tezzele, Gianluigi Rozza. **Advances in geometrical parametrization and reduced order models and methods for computational fluid dynamics problems in applied sciences and engineering: overview and perspectives**. Proceedings of the ECCOMAS Congress 2016, 7th European Conference on Computational Methods in Applied Sciences and Engineering, 2016. https://doi.org/10.7712/100016.1867.8680

Journal Publications

1. G .Corsi, A. Favata, S. Vidoli. **A phase-field model for the brittle fracture of Euler–Bernoulli beams coupling stretching and bending**. Computer Methods in Applied Mechanics and Engineering, 427, 117030, 2024. https://doi.org/10.1016/j.cma.2024.117030
2. G. Corsi, F. Battista, P. Gualtieri, S. Vidoli. **Effect of realistic distributed loads on the bi-stable behavior of a pre-stressed aileron**. Acta Mechanica, 235(5), 3059-3071, 2024. https://doi.org/10.1007/s00707-024-03859-5
3. G. Corsi, P. G. Ledda, G. Vagnoli, F. Gallaire, A. De Simone. **Instability and trajectories of buoyancy-driven annular disks: A numerical study**. Physical Review Fluids, 9(4), 043907, 2024. https://doi.org/10.1103/PhysRevFluids.9.043907
4. Giovanni Corsi, Antonino Favata, and Stefano Vidoli. **A coarse-grained constitutive law for fracturing beams based on a sharp interface crack representation**. International Journal of Solids and Structures 269, 112224, 2023. https://doi.org/10.1016/j.ijsolstr.2023.112224
5. Alberto Lolli, Giovanni Corsi, and Antonio De Simone. **Control and navigation problems for model bio-inspired microswimmers**. Meccanica pp. 1–15, 2022. https://doi.org/10.1007/s11012-022-01567-9
6. Giovanni Corsi. **Asymptotic approach to a rotational Taylor swimming sheet**. Comptes Rendus Mécanique. 349.1, pp. 103–116, 2021. https://doi.org/10.5802/crmeca.75

7. Giovanni Corsi, Antonio De Simone, Corrado Maurini, Stefano Vidoli. **A neutrally stable shell in a stokes flow: a rotational Taylor's sheet**. Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences. 475.2227, p. 20190178, 2019. https://doi.org/10.1098/rspa.2019.0178

October 18, 2024