

Nicola Demo

Website: nicolademo.xyz
Email: nicola.demo@sissa.it
Linkedin: [nicola-demo](#)
Github: github.com/ndem0

EDUCATION AND EXPERIENCE

Tecnologo

I am employed as Technologist within the SISSA mathLab group, in the Mathematical Analysis, Modelling and Applications area.

SISSA, Trieste

2023 - current

Chief Technology Officer

I am co-founder and chief technology officer of the FAST Computing company

FAST Computing Srl, Trieste

2022 - current

Research Fellow

I was employed as researcher fellow (“Assegnista di ricerca”) within the SISSA mathLab group, in the Mathematical Analysis, Modelling and Applications area. My main research topics are: model order reduction, data-driven modeling, scientific computing, parallel programming, shape parameterization, shape optimization, machine learning, deep learning

SISSA, Trieste

2017 - 2023

Internship

During the MHPC thesis, I worked as HPC specialist to build an efficient pipeline for the naval bulb shape optimization, coupling an automated freeform deformation, a finite volume solver and the model reduction

Fincantieri, Trieste

2016

Master in HPC

thesis: 'Increasing speedup of naval hull workflow optimization using Reduced Order Method' with the supervision of Prof. L. Heltai

SISSA, Trieste

2015 - 2016

B. Sc. in Computer Science

thesis: 'Parallelizzazione e vettorizzazione di un algoritmo Lattice Boltzmann mediante direttive di compilazione' with the supervision of Prof. F. S. Schifano

University of Ferrara

2012 - 2015

Scientific diploma

Liceo Ariosto, Ferrara

2007 - 2012

PROJECTS

MARINAI

I worked as a machine learning specialist, developing quick surrogate models and integrating them into the propeller design workflow.

BJMI

I worked as an AI specialist, designing and implementing a neural network to identify geometric features.

ARGOS

I designed and implemented the ARGOS server architecture, and I designed applications within ARGOS.

AROMA

I developed methodologies for CFD using an approach data-based, implementing them inside an open source environment. I developed the web graphical interface ARGOS as frontend of the AROMA-CFD methodologies, so making them available directly on web-browser

UBE2

In this project, I dealt with the implementation of a web interface capable to perform, and visualize, real-time algorithms for the higher order spectral analysis

PhD4PMI

In this Proof of Concept, I collaborate with Wärtsilä in merit of application of machine learning and deep learning algorithm to estimate the fuel consumption for hybrid naval engine

MISTI

I collaborate with the Massachusetts Institute of Technology for an advanced optimization pipeline that includes reduced order modeling, shape parameterization, multi-fidelity models, gaussian process regression

SOPHYA

I have been involved in the POR-FESR SOPHYA project, which had the goal of increase the performances of planing hulls. In particular, I worked on the data-driven reduced order model and on the shape parameterization for an efficient shape optimization procedure

SAFE

I contributed within the POR-FESR SAFE project for the development of a digital twin of the ship, based on graph theory, for the dynamic quantification of damages occurred on-board.

HeAD

Within this project, I had the opportunity to collaborate with Fincantieri SpA for the development of an (open source) framework capable to exploit the reduced order modeling benefits for an industrial shape optimization problem

SOFTWARE

PyDMD

Python Dynamic Mode Decomposition

<https://mathlab.sissa.it/pydmd>

EZyRB Easy Reduced Basis Method	https://mathlab.sissa.it/ezyrb
PyGeM Python Geometrical Morphing	https://mathlab.sissa.it/pygem
ARGOS Advanced Reduced order modellinG: Online computational web server for parametric Systems	https://argos.sissa.it
PINA Physics-Informed Neural networks for Advanced modeling	https://mathlab.github.io/PINA/

CONFERENCE

SIAM MDS 2024 Presentation and Tutorial Session Physics Informed Neural Networks for Advanced Modeling: PINA Library and Tutorials	<i>Atlanta, October 2024</i>
Eccomas Congress 2024 9th European Congress on Computational Methods in Applied Sciences and Engineering PINA: a PyTorch Framework for Deep Differential Equation Learning for Research and Production Environments	<i>Lisbona, June 2024</i>
ICLR 2024 Poster Presentation at AI4DifferentialEquations workshop PINA: a PyTorch Framework for Solving Differential Equations by Deep Learning for Research and Production Environments	<i>Vienna, May 2024</i>
Advanced School on Applied Machine Learning Summer School on Applied ML at ICTP Accelerating Numerical Simulations by means of Physics Informed Machine Learning	<i>Trieste, May 2024</i>
M2P2023 Eccomas Conference on Emerging Technologies in Computational Science for Industry, Sustainability and Innovation ARGOS: The Computational Web Platform for Fast Simulation	<i>Teormina, Messina, June 2023</i>
CSE23 SIAM Conference on Computational Science and Engineering Real-Time Modeling Through Neural Networks: Challenges and Perspectives	<i>Amsterdam, Febraury 2023</i>
ESB2022 27th Congress of the European Society of Biomechanics A Web platform for data-driven, real-time modeling and visualizing cardiovascular problems	<i>Oporto, June 2022</i>

SIMAI 2020+2021*Parma*, September 2021

Convegno nazionale della Società Italiana di Matematica Applicata e Industriale

A Computational Pipeline Exploiting Reduced Order Modeling Techniques For Industrial Shape Optimization Problems

MARINE 2021*Virtual (Edinburgh)*, June 2021

IX International Conference on Computational Methods in Marine Engineering

Data-driven reduced order modeling for efficient solution of industrial shape optimization problems

CSE21*Virtual (Fort Worth)*, January 2021

SIAM Conference on Computational Science and Engineering

Accelerating Shape Optimization Problems by Means of Model Order Reduction

WCCM ECCOMAS*Virtual (Paris)*, January 2021

A Modular And Data-driven Framework Involving Reducing Order Methods For Naval Optimization Industrial Problems

DAEDALUS Winter School*Berlin*, December 2019

Machine Learning meets Numerical Analysis of PDE

ROM Summer School*Trieste*, July 2019

Reduced Order Methods in Computational Fluid Dynamics

MARINE*Goteborg*, May 2019

VII International Conference on Computational Methods in Marine Engineering

MOR Summer School*Hamburg*, September 2018

Model Order Reduction Summer School

NAV*Trieste*, 2018

19th International Conference on Ship & Maritime Research

PUBLICATIONS

The complete list of all publications is attached on a separate files.