Nicola Demo

Website: nicolademo.xyz
Email: nicola.demo@sissa.it
Linkedin: nicola-demo
Github: github.com/ndem0

Education and Experience

Research Fellow
SISSA, Trieste
2017 - current

I am currently 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

Internship
Fincantieri, Trieste
2016

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

Master in HPC
SISSA, Trieste
2015 - 2016

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

B. Sc. in Computer Science
University of Ferrara
2012 - 2015

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

Scientific diploma
Liceo Ariosto, Ferrara
2007 - 2012

Projects

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 https://mathlab.sissa.it/pydmd
Python Dynamic Mode Decomposition

EZyRB https://mathlab.sissa.it/ezyrb
Easy Reduced Basis Method

PyGeM https://mathlab.sissa.it/pygem
Python Geometrical Morphing

ARGOS https://argos.sissa.it
Advanced Reduced order modellinG: Online computational web server for parametric Systems

Conference

ESB2022 *Oporto*, June 2022
27th Congress of the European Society of Biomechanics [slides: slides.com/nicolademo/deck]
A Web platform for data-driven, real-time modeling and visualizing cardiovascular problems

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.