Antonio **Pucciarelli**

Aeronautical Engineer

Milan · Italy

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Summary

In 2017 I moved from Salerno to Milano with the intent of building my career in the aerospace field. I started the MSc pointing to have a good comprehension of internal and external flow physics, so I decided to create a personalized learning track based on CFD, turbomachinery design and flows modeling. Over the next few years, I intend to develop as aerospace engineer in the field of turbomachinery analysis, modeling and optimization. I am also interested in external aerodynamics, its modeling and the study of aeroelastic effects. During my training program at von Karman Institute for fluid dynamics, I worked on a novelty method based on machine learning adapted to turbomachinery. Currently I am working on extending this method to all the possible types of turbomachines in order to generate a universal designing tool.

Education

von Karman Institute for Fluid Dynamics — *Sint-Genesius-Rode, Belgium*

Short Training Program · Turbomachinery & Machine Learning — *2022 - 2023*

Politecnico di Milano — *Milano, Italy*

Master Degree in Aeronautical Engineering · Aerodynamics & Propulsion Track — *2021 - 2023*

Bacherlor Degree in Aerospace Engineering — *2017 - 2020*

Projects

`datablade` — *Milano, Italy*

Private Project — *May 2023 - present*

- Continuation of my MSc thesis work
- Extention of the capabilities of the program to LPT and compressors
- GUI generation

Machine Learning for Turbomachinery · Master Thesis — *Sint-Genesius-Rode, Belgium*

Short Training Program · von Karman Institute for Fluid Dynamics — *Oct 2022 - Nov 2022*, *Feb 2023 - Apr 2023*

- von Karman Institute in-house program (developed from scratch)
- 2D airfoil database generation
- Machine learning adapted to turbomachinery blades

Aerospace Control Systems — *Milano, Italy*

`https://github.com/antoniopucciarelli/controlPRJ`

Control Dynamics — *May 2022 - Jun 2022*

- System dynamics study
- Stability analysis
- System uncertainties analysis
- Controllers design

Liquid Rocket Engine: Design, Analysis and Simulation — *Milano, Italy*

`https://antoniopucciarelli.github.io/assets/pdf/spacePropulsionPRJ.pdf`

Spacecraft Propulsion — *May 2022 - May 2022*

- Tanks, combustion chamber and nozzle design
- Unsteady firing simulation with NASA CEA wrapping
- Monte Carlo analysis of the thrust with respect to the uncertainties related to the manufacturing process

Solid Rocket Motor: Firing Test Data Analysis and Simulation — *Salerno, Italy*

`https://github.com/antoniopucciarelli/spacePropulsionFlipped`

Spacecraft Propulsion — *Apr 2022 - May 2022*

- Vieille's law computation from firing test pressure traces
- Ballistic simulation of a solid rocket engine with different nozzles
- Monte Carlo analysis of the firing time with respect to the uncertainties on the Vieille's law

Axial Compressor Preliminary Design

`https://github.com/antoniopucciarelli/turboLIB`

Salerno, Italy

TURBOMACHINERY

Mar 2022 - May 2022

- Mean line design
- Pressure losses modeling
- Non isentropic radial equilibrium study
- 3D blade shape design
- Python library – `turboLIB`

Combustion Chamber Modeling

`https://github.com/antoniopucciarelli/CFDprj`

Milano, Italy

CFD · FLUID DYNAMICS & COMBUSTION MODELING

Oct 2021 - Jan 2022

- 2D & 3D analysis of an hydrocarbon combustion in a combustion chamber using the finite volume method
- Unsteady compressible reactive simulation in OpenFOAM
- Finite volume method analysis of the problem: topology, solution procedure and solvers
- Spray modeling in a finite volume method code
- Wall surface analysis in a finite volume method code
- Turbulence modeling

EnelX Value Proposition: Sketch, Analysis and Validation

`https://antoniopucciarelli.github.io/assets/pdf/HTSprj.pdf`

Milano, Italy

HIGH-TECH STARTUP

Sep 2021 - Jan 2022

- Value proposition generation
- Validation of the value proposition and business model

Injector Study and Liquid Jet Break Up in Liquid Rocket Engines

`https://antoniopucciarelli.github.io/assets/pdf/LRE.pdf`

Milano, Italy

COMBUSTION

May 2021 - Jun 2021

- Liquid rocket engine analysis
- Liquid jet break-up qualitative analysis and implication in the combustion chamber

Weissinger Method: Study, Analysis and Coding

`https://github.com/antoniopucciarelli/aeroWEISS`

Milano, Italy

AERODYNAMICS

Dec 2020 - Jan 2021

- Incompressible study of the flow over 3D wings using a horseshoe vortex based method
- Analysis of the 3D drag on a wing for a potential flow
- Ground effect study
- Matlab program – `aeroWEISS`

Hess-Smith Method: Study, Analysis and Coding

`https://github.com/antoniopucciarelli/aeroHS`

Milano, Italy

AERODYNAMICS

Jun 2020 - Jan 2021

- Potential flow study using the Hess-Smith model based on vortex/sources/sinks distribution over an airfoil
- Analysis of the interaction between two airfoils in tandem
- Ground effect analysis
- Fortran program – `aeroHS`

Satellite Orbital Transfer Analysis

`https://antoniopucciarelli.github.io/assets/pdf/IAMSprj.pdf`

Milano, Italy

ORBITAL DYNAMICS

May 2020 - Jun 2020

- Study and generation of three orbital transfers for a satellite
- Comparison the three sketched orbital maneuver

Canard Wing: Modeling and Analysis

Milano, Italy

STRUCTURAL DYNAMICS

May 2020 - Jun 2020

- Canard wing mesh generation and load application in FEMAP
- Results computation using NASTRAN
- Static analysis under loading
- Free modes analysis

RL10-A33A: Modeling, Study and Analysis

`https://antoniopucciarelli.github.io/assets/pdf/RL10.pdf`

`https://github.com/antoniopucciarelli/NHE`

Milano, Italy

AEROSPACE PROPULSION

Nov 2019 - Jun 2020

- Analysis and reverse engineering design of the Pratt & Whitney liquid rocket engine
- 1D heat exchange simulation of the nozzle in Matlab – `NHE`

Writing

Paper Publication *Sint-Genesius-Rode, Belgium*

RESEARCHER · VON KARMAN INSTITUTE FOR FLUID DYNAMICS *Oct 2023 - present*

- Working with Prof. Sergio Lavagnoli on writing a paper on *Data Driven Design Methods in Turbomachinery*. This paper will be published by Elsevier. The content of this work is a slight extension of my thesis work.

Skills

Programming Python, Fortran, C/C++, Matlab, LaTeX, CMake, GNUplot
Programs OpenFOAM, NASTRAN, openscad, xFOIL, NASA CEA, xflr5, Femap, SolidWorks, SolidEdge, Inventor

Languages

Italian Native
English Full Proficiency · writing, speaking, listening
Norwegian Basic knowledge · self-taught

Marks

Master degree • Aeronautical engineering	**120 CFU**	**27.26 / 30**
◦ **Aerodynamics**	10 CFU	27 / 30
◦ **Aerospace control systems**	6 CFU	30 / 30
◦ **Aerospace structures**	10 CFU	27 / 30
◦ **Aircraft engines**	6 CFU	25 / 30
◦ **Airplane performace and dynamics**	10 CFU	27 / 30
◦ **Combustion in thermochemical propulsion**	8 CFU	28 / 30
◦ **Computational techniques for thermochemical propulsion**	8 CFU	30 / 30
◦ **High-tech startups: creating and scaling up I**	6 CFU	26 / 30
◦ **Numerical modeling of differential problems**	6 CFU	30L / 30
◦ **Turbomachinery B**	8 CFU	28 / 30
◦ **Turbulence: physics and modeling**	8 CFU	26 / 30
◦ **Space propulsion B**	6 CFU	26 / 30
◦ **Structural dynamics and aeroelasticity**	10 CFU	25 / 30
◦ Degree in **Aeronautical Engineering** - Thesis with **Opposer**	20 CFU	

Bachelor degree • Aerospace engineering	**180 CFU**	**27.23 / 30**
◦ **Analisi e geometria 1**	10 CFU	27 / 30
◦ **Analisi e geometria 2**	10 CFU	29 / 30
◦ **Calcolo numerico ed elementi di analisi**	10 CFU	27 / 30
◦ **Dinamica di sistemi aerospaziali**	8 CFU	27 / 30
◦ **Elettrotecnica e elettronica applicata**	10 CFU	27 / 30
◦ **Fisica tecnica**	10 CFU	27 / 30
◦ **Fluidodinamica**	10 CFU	21 / 30
◦ **Fondamenti di automatica**	8 CFU	28 / 30
◦ **Fondamenti di chimica**	7 CFU	24 / 30
◦ **Fondamenti di fisica sperimentale**	12 CFU	27 / 30
◦ **Fondamenti di meccanica del volo atmosferico**	5 CFU	28 / 30
◦ **Fondamenti di meccanica strutturale**	10 CFU	26 / 30
◦ **Fondamenti di sperimentazione aerospaziale**	6 CFU	20 / 30
◦ **Impianti e sistemi aerospaziali**	8 CFU	25 / 30
◦ **Informatica**	6 CFU	25 / 30
◦ **Introduzione all'analisi di missioni aerospaziali**	2 CFU	30 / 30
◦ **Istituzioni di ingegneria aerospaziale**	8 CFU	26 / 30
◦ **Meccanica aerospaziale**	10 CFU	27 / 30
◦ **Metodi di rappresentazione tecnica**	7 CFU	29 / 30
◦ **Modellazione di strutture aerospaziali**	6 CFU	22 / 30
◦ **Propulsione aerospaziale**	7 CFU	23 / 30
◦ **Tecnologie e materiali aerospaziali**	7 CFU	24 / 30
◦ Prova finale di **analisi di missioni aerospaziali**	1 CFU	30 / 30
◦ Prova finale di **propulsione aerospaziale**	1 CFU	30L / 30
◦ Prova finale di **tecnologie e material aerospaziali**	1 CFU	24 / 30