Antonio **Pucciarelli**

Aerospace Engineer

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Summary

Five years ago, 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 flows, 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 turbulence modeling and turbomachinery analysis, modeling and optimization. I am also interested in external aerodynamics, its modeling and the study of aeroelastic effects. Currently I am working at my master thesis based on machine learning adapted to turbomachinery at von Karman Institute for fluid dynamics. This project is allowing me to study a very important subject in the turbomachinery field and it is shaping me for the work/research abroad.

Education

von Karman Institute for Fluid Dynamics — *Brussels, Belgium*

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

Politecnico di Milano — *Milano, Italy*

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

Bacherlor Degree in Aerospace Engineering — *2017 - 2020*

Projects

Machine Learning for Turbomachinery · Master Thesis — *Brussels, Belgium*

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

- von Karman Institute in-house program (developed from scratch)
- 2D/3D airfoil database generation
- Machine learning adapted to the database
- GUI generation for the application

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 — *Salerno, Italy*

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

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

Milano, Italy

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

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

Milano, Italy

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

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

Milano, Italy

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

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

Milano, Italy

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

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

Milano, Italy

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

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

Milano, Italy

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

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

Milano, Italy

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

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

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`

Skills

Programming Python, Fortran, C/C++, Matlab, LaTeX, CMake, GNUplot, Solidity

Programs OpenFOAM, NASTRAN, openscad, xFOIL, NASA CEA, xflr5, Femap, SolidWorks, SolidEdge, Inventor

Marks

Master degree • Aeronautical engineering	**120 CFU**	**27.55 / 30**
◦ **Aerodynamics**	10 CFU	27 / 30
◦ **Aerospace control systems**	6 CFU	30 / 30
◦ **Aerospace structures**	10 CFU	27 / 30
◦ **Aircraft engines**	6 CFU	– / 30
◦ **Airplane performace and dynamics**	10 CFU	– / 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
◦ **Structural dynamics and aeroelasticity**	10 CFU	25 / 30
◦ **Space propulsion B**	6 CFU	– / 30
Bachelor degree • Aerospace engineering	**180 CFU**	**27.54 / 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