# Dan Hlevca

914-501-7617 | dan.hlevca@gmail.com | Location: Scottsdale, Arizona |
Green Card Holder: AUTHORIZED to WORK for ANY EMPLOYER in the United States

## Experience

**Lead Mechanical & Simulation Engineer** June 2024 – January 2025
*MATTUR - Powering a Better Future* *Scottsdale, AZ*

- Performing 2D and 3D numerical simulations using ANSYS Fluent
- Conducting PIV wind tunnel testing on a scaled model of a wind turbine
- Validating simulation results by correlating CFD data with experimental wind tunnel data
- Developing analytic tools to enhance the aerodynamic performance and design of the shrouded wind turbines
- Developing data-driven methods with predictive capabilities
- Optimizing wind turbine shroud design geometry using linear and non-linear optimization methods
- Designing a Machine Learning model incorporating AI algorithms to optimize the functionality of an Engine Control Unit (ECU)
- Designed AI algorithms to dynamically optimize wind turbine blade pitch in response to real-time wind velocity and rotational speed data, ensuring peak operational efficiency and maximizing energy output
- Developing Python scripts to visualize and perform statistical analysis on velocity data collected from an in-house designed wind sensor

**Senior Fluid Simulation Engineer** January 2023 – May 2024
*SMOORE International* *Scottsdale, AZ*

- Conducting 2D and 3D numerical simulations with ANSYS Fluent and OpenFOAM
- Creating data correlation models for prediction
- Using data reduction techniques (reduced order modeling)
- Applying Principal Component Analysis on chemical + sensory data
- Creating python codes to correct temperature data fields obtained with IR Cameras
- Evaluating electronic vaping products using analytical and experimental methods
- Developing test setups and designing experiments to learn about key parameters and to evaluate designs

**Research Engineer - Numerical Aerodynamics and Fluid Mechanics** Nov. 2016 – July 2022
*DynFluid Laboratory - Arts et Metiers ParisTech* *Paris, France*

- Conducting 2D and 3D numerical simulations and extracting essential data for comparison with experimental data (Ansys Fluent and OpenFOAM)
- Experience with numerical techniques to model turbulent flows (RANS, LES, etc.)
- Postprocessing scientific data using Python, TecPlot
- Knowledge of optimization tools and techniques, gradient optimization techniques
- Extraction of the turbulent characteristics from the flow through statistical analysis
- Using signal processing techniques to extract the turbulent characteristics of the flow field
- Creating reduced order models of the turbulent fluid flow through Proper Orthogonal Decomposition, Spectral POD, Dynamic Mode Decomposition
- Optimizing the experimental sensor placement in fluid flows to capture the coherent structures and to reduce redundancy

**Research Engineer - Experimental Aerodynamics and Fluid Mechanics** March 2014 – Oct 2016
*Institut AeroTechnique* *Saint Cyr l'Ecole, France*

- Wind tunnel model testing
- Evaluating and proposing the experimental measurements techniques
- Organizing the follow-up of the implementation, validating and qualifying the measurement devices and methods
- Using flow control techniques to adapt the flow to our needs
- Data acquisition systems experience (SPIV, Kulite sensors, Pitot Tube, Kiel Sonde, Aerodynamic Balance
- Ensuring the experimental data management and to monitor the exploitation of the experimental data
- Using actuators to create pulsating jets to actively control the flow
- Data postprocessing and data reduction techniques
- Applying analytical methods to compare wind tunnel data with CFD data

- Finding patterns in the experimental and numerical data

**Contractual Professor** September 2014 – Oct 2016

*EPF Engineering School* *Sceaux, France*

- Teaching Numerical Methods in Fluid Mechanics for Aeronautics & Space master students
- Creating 2D and 3D geometry for the flow domain with ANSYS Geometry
- Discretizing the flow domain with ANSYS Mesh
- Solving PDE's to obtaining a fluid flow solution (velocity and pressure fields on the flow domain)
- Postprocessing the results with Python and TecPlot

**Assistant Professor** September 2009 – March 2014

*Technical University of Civil Engineering* *Bucharest, Romania*

- Conducting professional development seminars for engineers on wind engineering, hydraulic machinery and systems
- Supported professors and researchers in constructing experimental setup and performing experiments with physical and virtual platforms
- Instructed students in senior level fluid mechanics courses during their in-class problem solving sessions, assisted them in their term projects and off-class office sessions, and graded their homework and quizzes
- Lectured students on laboratory techniques, and theoretical framework of the experiments; graded student work; utilized engineering software to design and create parts; analyzed data; investigated errors; researched and developed methodologies for projects and experiments
- Integrated wind tunnel instruments with data acquisition software

## Education

**Graduate Degree (in progress)** Tempe, Arizona

***Arizona State University - M.S. in Data Science in Mechanical and Aerospace Engineering***

**Coursework:** *Machine Learning, Artificial Intelligence, Data-Driven Modeling, Computational Methods for Engineering Systems, Applied Statistics*

**Focus:** *Application of ML/AI techniques to mechanical and aerospace systems, including fluid dynamics, control systems, and simulation-based optimization.*

**Expected graduation:** *May 2026*

**French/Romanian Joint Europeean Research Grant: - PhD Degree** Bucharest, Romania

*Technical University of Engineering - Passive & Active Flow Control* *Sep. 2009 – Aug. 2012*

**Thesis title: Numerical and experimental research on flow control in wind tunnels**

*Numerical and experimental research on aerodynamic flow control*

**Bachelor and Master in Science** Sep. 2004 – Aug. 2009

*Mechanical Engineering (Hydraulics, Aerodynamics, Electrical Engineering, Thermal Engineering)*

## Research Projects

**FOSCO - Forcing Of Separation COntrol** | *flow control, turbulent separated flows, pulsed jets, drag reduction.*

- The purpose of this project was to study the aerodynamic flow control at the rear of car vehicle, of interest to the automotive industry. Here we focused on obtaining reduced order models of the flow to help actuators to control the flow. The studied actuators are pulsating jets that completely destroy the recirculation bubble in the wake of the car.

**CAJE – Contrôle Aérodnamique par JEts** | *closed loop flow control, kulite sensors, reduced order modeling*

- The purpose of this project was to study the flow control at the rear of car vehicle, of interest to the automotive industry. This body reproduces a wake, characteristic of a large part of current automobile production. The objective here is to reduce aerodynamic drag, and therefore energy consumption. Through an experimental study in the wind tunnel, the idea is to test different active control strategies in order to understand their physical mechanisms, and to establish a number of recommendations for manufacturers wishing to deploy such systems. on their vehicles. Particular attention will be given to aerodynamic pulsating jets, by studying several model sizes.

**CABOF – Contrôle Aérodynamique en Boucle Ouverte et Fermée** | *numerical and experimental comparison*

- The objective here is to design and create a closed loop control strategy for flow around a car vehicle wake, characteristic of much of today's automotive production to reduce aerodynamic drag, and therefore fuel consumption. Through an experimental study in the wind tunnel, the idea is to test different control strategies in order to understand their physical mechanisms, and to establish a certain number of recommendations for manufacturers wishing to deploy such systems on their vehicles.

## Languages

**English**: full professional proficiency
**French**: full professional proficiency
**Spanish**: limited professional proficiency
**Romanian**: native language

## Publications

**1. Modal analysis of actively controlled flow past a backward facing ramp - (2020) AIAA** - https://arc.aiaa.org/doi/10.2514/6.2020-0100
**2. Atmospheric Boundary Layer Modeling in a Short Wind Tunnel - Europeean Journal of Mechanics/B fluids (2020)** - https://doi.org/10.1016/j.euromechflu.2019.10.003
**3. Experimental study of the active control applied to the flow past a backward facing ramp - Experiments in Fluids (2018)** - https://doi.org/10.1007/s00348-018-2497-0
**4. Active Control applied to the flow past a backward facing ramp: S-PIV measurements and POD analysis - (2015) 3AF France** - https://www.3af-aerodynamics.com
**5. Atmospheric Boundary Layer Modeling in a Short Wind Tunnel - (2014) 3AF France** - https://www.3af-aerodynamics.com
**6. Numerical predictions of the flow around a profiled casing equipped with passive flow control devices - (2013) Journal of Wind Engineering and Industrial Aerodynamics** - http://dx.doi.org/10.1016/j.jweia.2012.12.006
**7. Penstock failure detection system at the "VÂLSAN" hydro power plant - (2012) - 26th IAHR Symposium on Hydraulic Machinery and Systems, Tsinghua University, Beijing, China**
**8. Device for passive flow control around vertical axis marine turbine - (2012) - 26th IAHR Symposium on Hydraulic Machinery and Systems, Tsinghua University, Beijing, China**

## Granted patent

**1. Annular housing optimized for horizontal axis wind turbines** - https://EuropeanPatentOffice.org