Hesham GABALLA

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EDUCATION

2020–Present **DOCTOR OF PHILOSOPHY-PhD**, *Centrale Supélec-Paris Saclay University*, Paris,France.
Research field:Computational fluid dynamics(CFD), compressible two-phase flow,Duel-fuel injection modeling

2018–2019 **M.Sc.FLUID MECHANICS AND ENERGETICS**, *GRENOBLE INP ENSE3*, Grenoble, France.
Courses:Numerical simulation and modelling of turbulent flows,Hydrodynamic stability, Micro-fluidics, Signals analysis.
Specific courses:Aerodynamics,Advanced numerical simulations,Combustion,Thermodynamics,Heat transfer.

2013–2018 **B.Sc.AEROSPACE ENGINEERING**, *Cairo University*, Cairo, Egypt, **(Distinction with honors)**.
Courses: Aerodynamics,Computational fluid dynamics,Flight mechanics,Aircraft Structure design and analysis, Automatic control ,Design of airplane and rocket propulsion systems.

RESEARCH EXPERIENCE

2020–Present **PhD researcher**, *IFP Energies nouvelles (IFPEN)*, Rueil-Malmison,France.
Thesis:"Modelling of Dual-fuel jet breakup, phase-change and mixing"**(Marie-Curie EDEM project)**

- Liquid droplet phase-change DNS considering real fuel thermodynamics.
- LES of spray breakup,mixing for liquid/liquid fuel stream interaction relevant to dual-fuel engine conditions.

03/19–09/19 **Master's thesis**, *Aerodynamics, Energetics and Propulsion Department (DAEP)*, Institut Supérieur de l'Aéronautique et de l'Espace **(ISAE-SUPAERO)**, Toulouse,France.
Topic:"Optimal control for flow energy harvesting as applied to long-endurance fixed-wing UAVs"

- Theoretical analysis of the energy-harvesting mechanism of a simultaneously flapping and pitching two-dimensional wing.
- **URANS** Simulations to study the gust energy harvesting cycles using **Ansys Fluent Software**.
- **URANS** Simulations to determine the optimal control of the angle of attack during the gust energy harvesting cycles using **Ansys Fluent Software**.
- **Wind tunnel testing** of a simultaneously heaving and pitching wing.

2017–2018 **Propulsive wing UAV**, *B.Sc.Graduation Project*, Cairo University, Cairo,Egypt.

- **URANS simulations** for the cross flow fan (CFF) airfoil using **Ansys Fluent Software**.
- **Wind tunnel testing** for the cross flow fan (CFF) wing.
- Design and manufacturing of **propulsive wing UAV**.

2016–2017 **Space-X Hyper-loop Pod Competition**, *Team Leader of Brakes Sub-Team*, Hyper-Nova Team, Cairo,Egypt.

- Design of main magnetic brakes and emergency mechanical brakes for our full scale capsule.
- CAD modelling and stress analysis for both brakes using **Solid works Software**.

2015–2016 **AIAA(Design, Build and Fly Competition)**, *Team Leader of Aerodynamics and Stability Sub-team*, Cairo University Team, Cairo,Egypt.

- Aerodynamic Design and stability analysis of 2 UAVS using **XFLR5**.

2014–2015 **AASTL Lab**, *Team Leader of Composite Material and Structure Sub-team*, Aerospace Department, Cairo,Egypt.

- I worked on the fabrication of the molds and the full composite material structure of the penguin b UAV.

PUBLICATIONS

- **"Propulsive Performance of an Oscillating Airfoil Applied to Mini-Air Vehicles".**AIAA Aviation Forum June,2020.(Accepted)
- **"Design and Implementation of an Unmanned Aerial Vehicle with Self Propulsive Wing".**Advances in Mechanical Engineering 2019, Vol. 11(6) 1–10. "https://doi.org/10.1177/1687814019857299"
- **"Numerical Investigation of an airfoil with embedded cross flow fan for propulsion/circulation control".**Thirteenth International Conference of Fluid Dynamics (ICFD13), 21-22 December, 2018, Steigenberger Hotel El Tahrir, Cairo, EGYPT. "http://icfd-egypt.com/ICFD13_2018.html"

SKILLS

Soft-wares: CONVERGE–ANSYS (ICEM –Fluent- Static structural)–STARCCM+– Comsol Multiphysics – Femap NX Nastran – LABVIEW – Maple symbolic – SolidWorks –CAD – XFLR5–Simulink.
Programming:MATLAB—C– C++. **Others:**Excel — LATEX – Microsoft Office–OSs (Windows -Linux.)

Soft Skills: Presentation Skills– Problem Solving– Technical Report Writing–Hard Working–Multitasking

HANDS ON PROJECTS:

(DESIGN): Design and Off Design of a 7 stage axial compressor – Design and Off Design of a Turbo Jet engine – 6 DOF airplane Simulator (MATLAB) – Wing Structure Design using FEMAP software – MATLAB code Solving Laplace Equation over an Airfoil using FDM–MATLAB code solving flow over Joukowski airfoil using Joukowski transformation– Preliminary and detailed design of a regional turboprop aircraft–Optimization of draft tube for hydroelectric power plant

(DESIGN and MANUFACTURING): Conventional UAVS – Hyper Loop Magnetic brakes subsystem – Hyper Loop body and Mechanical Assemblies – Propulsive Wing UAV Prototype (GRADUATION PROJECT)

RESEARCH INTERESTS

- Computational Fluid Dynamics (CFD)
- Mutli-phase flow modeling
- Active Flow Control
- Advanced Aerodynamics/Propulsion
- Turbo-Machinery
- Flow Energy Harvesting

TEACHING EXPERIENCE

2014–2017 **Part-Time Private Math and Physics Teacher** , *for different educational systems*, Cairo,Egypt.

- Newton Mechanics, Fluid Mechanics, Waves, Thermodynamics, Electricity and Magnetic Field.
- Calculus, Differential Equations, Linear Algebra, Trigonometry, Geometry and Solid Geometry

FUNDING AND AWARDS

2020–2023 **European Union Horizon 2020 Research and Innovation programme**, *PhD funding grant, in the frame work of Marie-Curie EDEM project.*

2017–2018 **Academy of scientific research and technology(ASRT)**, *final year projects grant for B.Sc.Graduation Project*, Cairo,Egypt.

2016–2017 **Academy of scientific research and technology(ASRT)**, *travel expenses grant for the Space-X Hyper-loop Pod Competition*, Cairo,Egypt.

ACTIVITIES:

2015–2016 **Entrepreneurship workshop participant**, *at American university in Cairo*, (AUC).

2014–2015 **Cairo runners faculty member**, *Cairo*, Egypt.

LANGUAGES

Arabic(Native), English(Fluent "IELTS score 7.5"), French(B1), German(Average).

REFERENCES

- **Dr: Chawki HABCHI (PhD thesis supervisor)**
- **Prof: Jean-Marc Moschetta (Master's thesis supervisor)**
- **Post-doc: Nikola Gavrilovic (Master's thesis supervisor)**