








Giuliano Guarino



	Nationality	Italian
	Date of birth	08/01/1995
	Telephone	+39 3890273909
	Email	giuliano.guarino@unipa.it
	LinkedIn	https://www.linkedin.com/in/giuliano-guarino-156765122
	Skype	live:.cid.9031ac936da7fa5e
	Address	Via Vespri Siciliani 33, 93100 Caltanissetta (CL), Italy

Academics

Ph.D. in Mechanical, Manufacturing, Management and Aerospace Innovation

11/2020 - Current **University of Palermo** (Palermo, Italy)

PhD project: Study of composite shell structures through the development of code employing innovative numerical methods alternative to FEM, with a main focus on the discontinuous Galerkin method. I have already carried out the static analysis of shells with a reference surface defined with a NURBS-based map and with cut-outs obtained implicitly through a level set function. I have used both Equivalent Single Layer and Layer Wise kinematic theories. I am currently working on the buckling analysis. In the next years I am going to focus on the nonlinear elasticity and the damage of composite.

Advisor: Professor Alberto Milazzo

M.S. in Aerospace Engineering

09/2016 - 03/2020 **University of Palermo** (Palermo, Italy)

Diploma

Date: 18/03/2020

Grade: 110/110 cum laude

Thesis: "An Equivalent Single Layer Discontinuous Galerkin formulation for composite shells" focuses on the elastic static analysis of laminated composite shells. The shell geometry is defined through a generic analytic map of the reference surface in non-orthogonal curvilinear coordinates. The analysis is carried out with a higher-order characterization of the displacement field through the thickness using an Equivalent Single Layer formulation. Along the reference surface the elements have high-order shape functions and are linked together using some penalty integrals along the interfaces in the context of the interior penalty discontinuous Galerkin method.

Advisor: Professor Alberto Milazzo

Courses

Topics of study: Aerospace and composite materials, FEM analysis, numerical methods, materials fatigue, flight dynamics, linear and advanced system control theory, robotic systems, aeronautic production technologies, aerospace propulsion, aircraft and systems design, corrosion of materials, experimental stress analysis, gasdynamics.

Projects: As part of my academic program, I was assigned individual and group-based projects for which I developed a code to study the stress on 3D structures by means of the FEM method, designed a control system for a sailboat, designed a cargo aircraft used for air-launched rockets and designed a rocket nozzle with CFD.

Laboratory skills: Gained proficiency in experimental stress analysis and relative error compensation.

B.S. in Mechanical Engineering (minor in Aerospace)

10/2013 - 07/2016 **University of Palermo** (Palermo, Italy)

Diploma

Date: 18/07/2016

Grade: 110/110 cum laude

Thesis: "Sistemi di Navigazione (Navigation Systems)" is a technical review of the up-to-date navigation systems used in the aeronautic transportation field. In the first chapter it is given a standard classification. The thesis continues with the description of the radio-based ones (NDB, VOR, DME). In the third chapter the different global navigation satellites systems currently used or being built are described (GPS, GLONASS, Galileo). The third chapter focuses on the inertial navigation systems. In the conclusion the trends regarding new navigation systems in aviation are also summarized.

Advisor: Professor Alberto Milazzo

Courses

Topics of study: Applied mechanics, aerospace structures design, flight mechanics, CAD, mechanic and thermal measures, process machinery, turbomachinery, physics, thermodynamics, aerodynamics, electromagnetism.

Projects: As part of my academic program, I was assigned individual and group-based projects for which I designed the internal structure of a fuselage and the spar of a wing and designed the internal structure of a wing by means of Patran/Nastran.

Laboratory skills: Gained proficiency in mechanical and thermal measures and relative error compensation.

Awards and scholarships

UNIPA Scholarship for PhD students

11/2020 – Current **University of Palermo** (Palermo, Italy)

This scholarship is provided by the University of Palermo to help PhD students with the expenses they face during their doctoral studies in Palermo.

ASI-CAIF "Borse di apprendistato scientifico in USA" scholarship

08/2019 – 09/2019 **Italian Space Agency** (Rome, Italy)

The scholarship provided by the Italian Space Agency is aimed at financing a period of two month for Italian students conducting research in a university or laboratory in the United States. This scholarship partially covered my expenses during the period I spent at Brown University conducting research for my master's thesis.

UNIPA "Borse di mobilità outgoing" scholarship

08/2019 – 09/2019 **University of Palermo** (Palermo, Italy)

This scholarship provided by my university is aimed at financing experiences abroad for graduate students. This scholarship partially covered my expenses during the period I spent at Brown University conducting research for my master's thesis.

Erasmus+ traineeship scholarship

11/2018 – 01/2019 **ARCES** (Palermo, Italy)

This scholarship is provided by the ARCES association in Palermo under Erasmus founding to finance an internship of three months for students enrolled in a Sicilian university. This scholarship partially covered my expenses during the internship at the European Space Agency (ESA).

Research and teaching experience

Teaching assistant

01/11/2020 - Current **University of Palermo** (Palermo, Italy)

As part of my doctoral program, I serve as a teaching assistant and provide course support to my advisor for the courses of Aerospace Constructions and Aerospace Materials. My duties include developing classwork and homework, as well as leading class resuscitation, and occasionally lectures.

Academic Tutor

01/09/2013 - 31/10/2020 **University of Palermo** (Palermo, Italy)

During my academic career I have given private lessons to my peers. In total, I have helped around 30 of my peers with their exams in the subjects of Math, Calculus and Physics I and II.

Visiting Scholar

01/08/2019 - 30/09/2019 **Brown University** (Providence, USA)

Awarded two scholarships to collaborate on my master's thesis with Professor Chi Wang Shu, Ph.D., in the Applied Mathematics Department at Brown University. During my time as a visiting scholar, I achieved competencies regarding numerical methods, most notably discontinuous Galerkin, high-order shell theories and nonlinear elasticity. I also had the chance to attend several Ph.D. dissertations and a seminar of Professor J.N Reddy.

Intern

03/09/2018 - 28/02/2019 **European Space Agency** (Madrid, Spain)

Selected to a six-month founded internship position at the European Space Astronomy Centre and worked on a project under the mentorship of Mark Bentley, Ph.D. The purpose of my project was to analyze the Rosetta/ MIDAS dataset by studying and characterizing the collected comet dust particles data by modelling their shape and texture using local regression methods. My findings were presented at the Rosetta Dust Workshop in Trieste, Italy, in March 2019.

Publications

High-fidelity analysis of multilayered shells with cut-outs via the discontinuous Galerkin method

11/2021 **Composite Structures**

Link: <http://www.sciencedirect.com/science/article/pii/S0263822321009612>

Short Abstract: A novel numerical method for the analysis of multilayered shells with cut-outs is presented. In the proposed approach, the shell geometry is represented via either analytical functions or NURBS parametrizations, while generally-shaped cut-outs are defined implicitly within the shell modelling domain via a level set function. The multilayered shell problem is addressed via the Equivalent-Single-Layer approach. The shell governing equations are derived from the Principle of Virtual Displacements of three-dimensional elasticity and solved via an Interior Penalty discontinuous Galerkin method. Numerical tests are performed to model the static response of a cylindrical shell and a NURBS-based shell with a cut-out.

Equivalent-Single-Layer discontinuous Galerkin methods for static analysis of multilayered shells

10/2021 **Applied Mathematical Modelling**

Link: <http://www.sciencedirect.com/science/article/pii/S0307904X21002845>

Short abstract: An original formulation for the elastic analysis of multilayered shells is presented in this work. The key features of the formulation are: the representation of the shell mean surface via a generic system of curvilinear coordinates; the unified treatment of general shell theories via an Equivalent-Single-Layer approach based on the through-the-thickness expansion of the covariant components of the displacement field; and an Interior Penalty discontinuous Galerkin scheme. Several numerical tests are presented for multilayered shells with different geometrical configurations.

Conferences and workshops

AIAA SciTech 2022

01/2022 **San Diego, USA**

Topic: The conference was the annual congress organized by the American Institute of Aeronautics and Astronautics.

Presentation: "Buckling analysis of multilayered structures using high-order theories and the implicit-mesh discontinuous Galerkin method". The presentation revolved around the extension of the Discontinuous Galerkin method for the linear buckling analysis of plates and shells.

AIDAA XXVI International Congress

09/2021 **Pisa, Italy**

Topic: The conference was the annual congress organized by the Italian Association of Aeronautics and Astronautics (AIDAA) aimed for researchers in the aerospace field.

Presentation: "A Layer-Wise discontinuous Galerkin approach for laminated composite shells". During this conference I introduced for the first time in the formulation I have developed during my Ph.D. the possibility to describe the displacement field with a Layer-Wise approach.

ICCS24 - 24th International Conference on Composite Structures

06/2021 **Porto, Portugal**

Topic: The conference organized by the journal Composite Structure revolved around the novelties regarding composite materials.

Presentation: "Discontinuous Galerkin models for composite multilayered shells with higher-order kinematics". In my presentation I detailed for the first time the advantages of studying a laminated composite structure with a combination of a NURBS-based map, an implicitly-defined cut-out and a discontinuous Galerkin formulation.

AIDAA PhD Aerospace Day

02/2021 **Web conference**

Topic: The conference was organized by AIDAA with the aim of connecting Ph.D. students in the aerospace field from all over Europe.

Presentation: "Analysis of multilayered shells via discontinuous Galerkin methods". In my presentation I described the formulation I have developed for my master's thesis, giving also some unpublished numerical examples.

Rosetta Dust Workshop

03/2019 **Trieste, Italy**

Topic: The workshop reunited some of the researchers working on data from ROSETTA mission.

Presentation: "Shape descriptors for the MIDAS particles: surface roughness and more". The presentation of the results obtained in my internship at ESA regarding the evaluation of the geometrical properties of the particles collected and scanned by MIDAS was given on my behalf by the at the time P.I. of MIDAS Thuid Mannel, Ph.D.

AIDAA XXIV International Congress

09/2017 Palermo and Enna, Italy

Topic: The conference was the annual congress organized by AIDAA.

Participation: I attended the presentations inherent to aerospace materials and structures as a Master student.

Language skills

	Years studied	Level
Italian	15	Mother tongue
English	13	C1 - Fluent
Spanish	1	B1 - Intermediate

Soft skills

Communication




Reviewing and reporting	Communication with your peers and mentors is a key for a good doctoral experience.
Public speaking	In my group I am asked to report to my tutor and my colleagues twice a week and occasionally present my most recent findings to the doctoral program committee.
Exchanging feedback	
Mediation	

Organization




Goal setting	Organizations is one of my strongest qualities. I like to plan in detail my future activities, setting milestones and goals. I know how to work under pressure to meet a deadline carrying out at the same time other tasks. These qualities have been very helpful during my academic path and are being essential during my PhD.
Meeting goals	
Self-discipline	
Multitasking	
Attention to detail	

Computer skills




Programming

Python		I used Matlab to develop the software for my thesis. Since I started my PhD I switched to Python. Using Object Oriented programming I have developed a four-thousand-line code. I use Mathematica to obtain the formulations for my project.
Matlab		
Mathematica		




Microsoft Office

Word		I used Word for basically every technical report for my courses. Some exams also required computation through excel. I have recently started using Access to develop a database to handle the references for my research.
Excel		
Access		



CAD software

AutoCAD		I started doing 2D drafts in AutoCAD for the industrial design course at my bachelor. For the course aircraft design at my master I used SolidWorks and Rhinoceros for 3D design.
SolidWorks		
Rhinoceros		

FEM software

Abaqus		I have used FEM software throughout my whole academic career. Currently I am using Abaqus to verify the results obtained with the code I am developing.
Ansys		
Nastran-Patran		

Others

LaTeX		I used LaTeX for my thesis and my two papers. I used Gwyddion for image processing during my time at ESA.
Gwyddion		

Membership in scientific and professional organizations

Qualification to practice as an engineer

11/2021 Passed the exam with a score 48/50

AIDAA Member

02/2021 Member of the Italian Association of Aeronautics and Astronautics

AIAA Member

01/2022 Member of the American Institute of Aeronautics and Astronautics

References

Dr. Alberto Milazzo

Email alberto.milazzo@unipa.it
Telephone +39 338 872 3060
Relationship Academic Advisor

Dr. Vincenzo Gulizzi

Email vgulizzi@lbl.gov
Telephone +39 327 781 1918
Relationship Cotutor and Coauthor

Dr. Ivano Benedetti

Email ivano.benedetti@unipa.it
Telephone +39 338 642 6843
Relationship Professor

Mr. Elvio La Rocca

Email elviolarocca0@gmail.com
Telephone +39 345 651 7189
Relationship Colleague

I hereby declare that all the information contained in this curriculum vitae is in accordance with facts or truths to my knowledge. I take full responsibility for the correctness of the said information.

Date

07/02/2022

Signature

