CURRICULAR SYNTHESIS

Prof. Dr. Ing. Arch. Michele Buonsanti
Contract Professor at DICEAM Department
Aggregate professor of Safety Model and Mechanics of Material (retired)
Full Researcher & Accountable of MAAL Laboratory (retired)

Department of Civil Engineering, Environment, Energy and Materials DICEAM

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S.A.S. Consulting Engineering

Structural-Aeronautical-Safety Consulting Engineering

Reggio Calabria - Italy

Update: January 2025

A- PROFILE

Born in Reggio Calabria on 08.11.1955 and resident there in via del Seminario n.7. After having attended the two-year course in Physics at the MM.F.NN. Faculty of Sciences. from the University of Messina, in December 1980 he obtained a degree in Architecture V.O. (LM4), with a mark of 110/110 cum laude, from the Faculty of Architecture of Reggio Calabria, with a technological-design focus, discussing an experimental thesis whose contents concerned the application of the theorems of limit analysis to heterogeneous media such as earth, entitled: "*Geotechnical aspects of the construction of a plateau with a Pleistocene sedimentary structure: development of design problems with the use of linear programming techniques* ". Speakers: Profs. G. Del Piero, M. Squillaci, M. Maugeri.

•From 1982 to 1985 he carried out structural design activities as an official of a Railroad State Agency (F.S.)

•Since 1982 he has collaborated on teaching and research in various universities at the Faculty of Engineering and/or Architecture.

•From 1985 to 1995 he carried out partial professional activity in the field of structural engineering

•In 1990 he was appointed by the Council of the Faculty of Engineering of Reggio Calabria as subject expert for the discipline "Mechanics of Structures"

•In 1991 he was admitted to the PhD in "Structural Engineering" VII cycle at the administrative headquarters of the University of Catania (with subsequent renunciation)

•Since 1992 he has been contracted for participation in teaching and research activities in the disciplines of the H07A "Mechanics of Structures" group at the Faculty of Engineering, university of Reggio Calabria

•In 1994 he was eligible, but not a winner, for the competition for Researcher in SSD H07A "Mechanics of Structures" at the Faculty of Engineering of the University of Reggio Calabria.

•Since 1997 he has been in charge, as a contract professor, of teaching the courses: *Theory of Structures, Computational Mechanics of Structures, Mechanics of Materials,* disciplines relating to the Degree Course in Civil Engineering, specialization in Structures at the Faculty of Engineering of Reggio Calabria

•In February 2003 he was qualified in the comparative evaluation regarding the role of University Researcher for the disciplinary scientific sector ICAR 08 and, with subsequent resolution of the Council of the Faculty of Engineering of Reggio Calabria, in April 2003 he was called into the role taking on service (due to block) in January 2004. With Rectoral Decree n°142/2008 he was confirmed in the role as Full Researchers (SSD ICAR 08) of the Mediterranean University of Reggio Calabria, then becoming Aggregate professor until October 2023 when out of role. From January 2024 he is a contractor professor in DICEAM department of the Mediterranean University of Reggio Calabria.

B- SCIENTIFIC ACTIVITY

After the Mechanics of Structures exam (1979), research work began which would lead to a first appreciable result represented by the work carried out for the degree thesis. The same is coordinated according to specific areas by the prof. Gian Pietro Del Piero (theoretical aspects), with prof. Michele

Maugeri (geotechnical and experimental aspects) and prof. Domenico Squillaci (territorial geological aspects).

In the essential contents, a new modeling on soil mechanics was sought, proposing an approach using the classic limit analysis methods of plasticity theory. A fundamental theoretical treatment resulted in the generation of a calculation model, which can be used in real aspects for the study of the stability of inconsistent artefacts typical of some lands.

After the degree exam (1980), for the years 1981-1982 the research was perfected by integrating it with experimental and laboratory data to obtain a case study of results on behaviors in the real field such as static and dynamic actions. A first appreciable result was published in a specialized journal. (see point G)

In 1984 he participated in the specialization course on "*Nonlinear calculation of reinforced concrete structures*" at the International Center for Mechanical Sciences in Udine, in-depth study of topics relating to cracking and viscosity.

In 1985 he participated in the specialization course on "*Automatic calculation of reinforced concrete structures"* at the International Center for Mechanical Sciences in Udine. in-depth study of topics relating to the control of structural ductility.

In 1987 he was appointed to carry out the functions of Coordinator of the professional refresher course "*Masonry in seismic areas: diagnosis, failures, rehabilitation*", organized by the architect's professional associations of Reggio Calabria.

In 1988 he partially participated, and for a short period, in a research program, coordinated by Prof. Giuseppe Spadea at the Department of Structures of the University of Calabria, relating to contact problems for two-dimensional solids.

In 1989 he began a brief collaboration in a research program coordinated by Profs. Salvatore Di Pasquale and Silvia Briccoli-Bati of the Department of Construction of the University of Florence addressing the problems concerning the collision *dynamics for rigid systems with unilateral constraints.*

In 1990, together with Prof. Mario Giovinazzo of the Faculty of Architecture of Reggio Calabria, he carried out a study relating to the proposal of construction systems composed of reinforced masonry panels. Through FEM modeling. the static and dynamic behavior of the panel was analyzed. The results of the research were presented at the 9th International Brick Masonry Conference in Berlin in October 1991 and subsequently published in the proceedings. The development of the research focused on the static and dynamic analysis of reinforced masonry systems

For the years 1990-1991, within the Faculty of Engineering of the University of Reggio Calabria he carried out research activities addressing aspects of *structural analysis under the hypothesis of unilaterality of constraints, with particular attention to NRT solids.*

In 1992-1993 he tackled studies concerning the *formulation of equilibrium problems for non-reacting tensile solids, taking an interest in theoretical aspects and variational approaches.* Abstract formulations, constitutive laws, and the weak formulation in equilibrium relations for NRT solids are explored in depth. The findings were presented at the 6th North American Masonry Conference at Drexel University in Philadelphia in 1993.

In 1994-95, the research was developed in the field concerning the phenomenon of fracture in such solids, trying to develop the problem according to adequate constitutive models for a possible descriptor tool of the quasi-chaotic phenomenon of brittle fracture. Non-linear and failure computational analyzes on solid walls have been developed for real models. (MURST 40% & 60% Programs, CNR Research Programs, P.O.P Reg. Calabria 1994))

In 1996-97 he began the study and in-depth analysis of the problems concerning structural control and structural identification from a theoretical and computational point of view. Some results were obtained subsequently and published in international journals and conferences.

Since 1998 he has been dealing with the mechanical behavior of materials relating to industrial engineering with *typical problems of yielding, damage and fracture phenomena, with constitutive models based on non-monotonic laws.*

Since 1999 he has combined theoretical aspects, through multi-disciplinary experimental experiences, with the investigation of deformation processes using specific methodologies for small scales, such as EC eddy-currents which, through their properties, allow detailed analysis up to scale of microstructures.

Extension of these experimental techniques, to the case of heterogeneous materials, were the subject of communications in two IASTED conferences.

Since 2000, research activity has been focused in particular in the field of *theoretical modeling of hyperelastic solids with poly-convex deformation potential.* In particular, we tried to overcome the well-known analytical difficulty relating to the fact that, when the energy functional loses its convexity, the direct methods of the calculus of variations lose their applicability. In the one-dimensional case the research led to a quite appreciable result since a hyper-elastic bar model was deduced, subject to axial action, hypothesizing a non-convex deformation potential, starting from the three-dimensional non-linear elastic theory for a material of Blatz-Ko. It has been shown that with an appropriate kinematic restriction, the Ericksen model is found enriched with an additional term of the deformation gradient. This term characterizes a grade-2 material and penalizes interface energies, generating two-phase solutions with a single soft interface. This last aspect is obtained through the use of gamma-convergence methods.

Experimental comparisons, with the response of metal bars under pure traction in the elasto-plastic field, have verified the reliability of the proposed model. A subsequent application of the result was interfaced with solution techniques for inverse problems. Details, solutions in terms of microstructures, were proposed in the case of bending, at the XVI AIMETA Congress and in EUROMAT2005. A proposal for a model, at the one-dimensional scale, simplified and with various stresses, was subsequently proposed. The extension to two-dimensional problems produced two proposals, from theoretical contents to the XV° & XVII° AIMETA (NC1, NC4) while, on the occasion of MCMS'03, computational modeling developments were presented.

Regarding the characterization of the *non-convex problem, as a solution in terms of microstructures, a simple form was characterized in the case of polymeric materials* while in relation to their temporal evolution two contributions, the first for numerical purposes and the second in terms of model, were subject of presentation and discussion, respectively in ICAMEM'06 and 8th HSTAM.

Subsequently, an interesting application of microstructures, as a first attempt at modeling on biological tissues, was carried out on the occasion of the VIII Workshop on Biomaterials and Biomechanics.

As an extension of this line of research, *the complex field of multi-physics problems was investigated, in particular the chemo-mechanical one.*

A one-dimensional solid is modeled in the context of finite elasticity considering not only the mechanical action but also the interaction with a chemically aggressive environment. In the proposed model, the dissipative phenomena associated with entropy production are neglected, imposing that the equilibrium states are minimums of the free energy of the system. The latter is made to depend on the axial stress and the degree of reaction of the constituents of the material with respect to the liquid or vapor solution in which the material is immersed. In general, the corresponding minimum problem is non-convex and predicts the coexistence of phases in equilibrium induced by mechanical

actions and chemical composition of the environment. The model is suitable for the description of important coupled phenomena such as the swelling of ionic gels in a solvent where the pH varies, or the formation and expansion of crusts in stone materials due to acid rain or chemically aggressive environments. The main work was published in the Journal of Elasticity.

In extension, some applications have been developed, as in the case *of polymeric membranes subjected to chemically aggressive actions and also in the case of granular materials immersed in chemically active mixtures.*

Following the multi-disciplinary collaboration, regarding experimental aspects on metallic materials through electromagnetic analyzes of the eddy-currents type, further positive results were obtained. This method, due to its nature of investigation and the quality of its results, has proven to be excellent in investigating the deformation regime in flat metallic elements subjected to mono- and/or bi-axial traction, for which one wishes to know the state of integrity at the micro-scale. In particular, the characterization of microstructures, as elements of concentrated deformation, has also been well highlighted in accordance with theoretical models.

In comparison, a "*soft computing*" type procedure has been proposed for the solution of the inverse problem. In particular, fuzzy and neuro-fuzzy techniques have been developed for the reconstruction of electrical voltage states comparable, albeit qualitatively, to mechanical ones that cannot be obtained experimentally. Great attention was paid to the microstructural analysis of elements subjected to mono- and bi-axial tensile loads using low computational load techniques, proving particularly useful for "in situ" applications.

The studies carried out have led to the maturation of skills in the context of the growth mechanisms of defects during the operation phase of structural elements.

A condensation of these multidisciplinary research aspects was the subject of an international research project and selected for publication in the Studies in Applied Electromagnetic and Mechanics series.

Finally, attention was paid to the study of the classification and characterization of defects in metal plates with the aid of detection techniques with low computational load, exploiting both the induced current method and ultrasonic techniques which are highly topical in the research panorama. experimental as well as theoretical. This experience led to the creation of several papers as reported in the publications list.

In parallel, the topic of the phenomenon of fragmentation of solid materials, understood as a phase transition, was investigated with the aim of explaining the origin of some typical structural impact phenomena on the macro-scale.

Since 2006, a multi-disciplinary research line has been developed regarding *mechanical damage in biological materials.* In particular, in synergy with the Department of Pathological Anatomy of the University of Siena, the behavior of human biological tissues subjected to freezing and thawing was experimentally investigated, a topic of significant interest as it diagnoses carcinogenic lesions. The experimental aspect is supported, in the context of finite elasticity, by *extensive theoretical analysis and computational modeling in order to have predictive models of tissue damage*. Some indicative results have been made known in international forums.

Similarly, to the aspect of tissue mechanics, in collaboration with the Regional Stem Cell Transplant Center & Cord Blood Bank of Reggio Calabria, work was also carried out *on "cellular" mechanics for problems relating to thermal actions and adhesion, detachment and rolling all phenomena. inside the endothelial tissues.*

The problem, which is constantly evolving, is of obvious interest since it concerns inflammatory and transplantation aspects (e.g. stem cells) of the endothelial vessels.

Theoretical and computational aspects have already been partly developed and made known through international communications both in conferences and in journals. These results open up interesting prospects for the formulation of behavioral models in great demand in the bio-medical field, as they are the basis for the compatibility of bio-materials suitable for transplant operations.

Since 2010, a line of research has been adapted regarding the response of granular materials subjected to static and dynamic actions, developing theoretical formulations, numerical modeling and simulations of events characterizing shock waves. At the same time, a line of research based on the *dynamic response of composite materials for aeronautical use has been widely developed, focusing attention on structural identification, with experimental dynamic methods capable of being compared with FEM simulation of panels subject to low energy impact.* This five-year research program was developed and agreed upon with the *Flight Experimental Department of the Italian Air Force.* The research has developed an innovative approach, based on *peridynamic theory and aimed at identifying, a priori, the fracture paths in aeronautical composites, when subjected to low energy impacts.*

Within the relevant Department, in 2014 he designed and created the *M.A.A.L. Laboratory. Mediterranean Aeronautics and Aerospace Laboratory,* for which he was responsible until the cessation of activities in 2020. Within the same, making use of inter-disciplinary scientific research, the following areas were developed:

• *Research and testing of the constitutive properties of advanced materials.*

• *Micromechanical characterization of materials, through models designed to relate the internal structure of a material to its mechanical properties.*

• *Physical-mathematical modeling of complex materials and/or with microstructure*

• *Numerical modeling.*

• *Modeling and simulation of mechatronic systems.*

• *Modelling, simulation and process control.*

• *Applications to autonomous vehicles and robotic systems*

• *Biomechanics.*

• *Mechanisms for aeronautical and aerospace applications.*

• *Monitoring systems based on intelligent agents*

• *Dynamic simulation and optimization.*

• *Technical-scientific dissemination in academic and scholastic settings.*

Furthermore, research activities and transfer of results and knowledge have been developed regarding the following topics:

1- Material and fracture mechanics

2- Structures and materials for aerospace

3- Materials and experimental aspects.

4- Aerospace Propulsion.

5- Electronics for space launchers.

6- Robotic Systems.

7- Experimental aeronautical constructions.

8- Monitoring systems based on intelligent agents

Like the laboratory's activities, the research focused on the aeronautical fields with particular regard to flight safety, both in terms of applied engineering and the human factor on sailors. The activity developed up to the present time aims to develop programs and analytical tools necessary to carry out the mandatory Risk Assessment & DecisionMaking actions, both for the different phases of the flight and for the areas of the organizational system as a whole. Some studies are reported within the list of publications. Under in-depth development, some modeling inherent within Bayesian theories, with particular regard to the determination of the Q.M.U. (quantification margin of Uncertainty) for specific Risk Assessment analyzes in operational phases of the flight.

C- TEACHING ACTIVITY

Carried out at the Faculty of Engineering of the Mediterranean University of Reggio Calabria, unless otherwise specified.

• Teaching assistance in lessons and carrying out exercises for the following courses:

A.A. 1987-1988 *Structural Mechanics* (prof. G. Spadea).

A.A. 1988-1989 *Structural Typology* (prof. G. Peguiron, Faculty of Architecture).

A.A. 1990 to 1998 *Solid Mechanics* (prof. M. Pasquino).

A.A. 1992-1993 *Structural Typology*. (prof. G. Peguiron, Faculty of Architecture)

A.A. 1994-1995 *Theory of Structures* (prof. M. Pasquino)

• Courses as a Contractor Professor

A.A. 1997-1998 *Finite Element Analysis*

A.A. 1998-1999 *Computational Analysis of Structures*.

A.A. 1999 until 2002 *Structural Theory.*

A.A. 1999 to 2004 *Computational Mechanics of Structures.*

A.A. 2002 until 2004 *Mechanics of Materials*

A.A. 2023- today *Safety Models*

A.A. 2024- today *Biomechanics*

• Didactic courses as tenured professor

A.A. 2003-2004 *Computational Mechanics of Structures*

A.A. 2004-2005 until the A.Y. 2007-2008 *Solid Mechanics II°*

A.A. 2008-2009 and 2009-2010 *Solid Mechanics*

A.A. 2010-2011 until 2012-2013 *Mechanics of Materials*

A.A. 2013-2014 & A.A. 2014-2015 *Solid Mechanics*

A.A. 2015-2016 *Mechanics of Materials*

A.A. 2016-2017 *Safety Models*

A.Y: 2017-2018 to 2019-20 *Mechanics of Materials & Mechanics of Structures*

A.A.: 2019-2020 up to 2021-22 *Mechanics of Materials*

• Substitute courses

A.A. 2004-until 2006 *Computational Mechanics of Structures*

A.A. 2005-2006 *Mechanics of Solids I°*

A.A. 2004-2005 until 2007-2008 *Mechanics of Materials*

A.A. 2008-2009 *Mechanics of Solid II°*

A.A.2013-2014 *Structural Morphology*

A.A.2013-2023 *Safety Models*

C1 – MASTER & DOCTORAL EDUCATIONAL ACTIVITY

-Teacher in related doctoral courses on topics relating to Mechanics of Materials since 2004

-Teacher at the 2nd level Master on the topic: Mechanics of Materials: *TWO-YEAR LEVEL UNIVERSITY MASTER'S MASTER FOR RESEARCH TECHNICIANS SPECIALIZED IN NEW TECHNOLOGIES FOR LAND DEFENSE AND ENVIRONMENTAL PROTECTION.* PROJECT PON01_01869 “Innovative Technologies and Materials for the Defense of the Territory and the Protection of the Environment - PON Research and Competitiveness 2007-2013

-Teacher at the "*Higher training of experts in the use of innovative aerospace-derived technologies for the exploitation of renewable energy"* course. Project PON03PE_00012_1: *Methods for the static and dynamic analysis of composite material structures.*

-2020 – today: Teacher at the *Solid Mechanics* modules in “*Civil, Environmental & Industrial Engineering*” PhD course inner the DICEAM Department at university of Reggio Calabria

D- INSTITUTIONAL POSITIONS

2004- Member of the University Scientific Commission for the Engineering area (2004-2007)

2004 to 2023: Member of the teaching body for the doctorate in Materials and Structures Engineering, then doctorate in Maritime and Structures Engineering, subsequent doctorate in Maritime Materials and Structures Engineering; doctorate in civil, environmental and safety engineering with administrative headquarters at the “Mediterranean” University of Reggio Calabria.

2004-2011 Member of the Integrated Academic Senate of the “Mediterranean” University of Reggio Calabria, as sole representative of the role of researchers.

2005-2008 Member of the Scientific Committee of the 2nd level Master in Environmental Engineering and Territorial Defense (2005-2008)

2005-2006 Member of the teaching body for the 2nd level Master in Biomedical Engineering

2008-2011 Member of the University Scientific Commission for the Engineering area.

2012-2017 Coordinator of the Master's Degree Course in Civil Engineering

E- PARTICIPATION IN OFFICIAL RESEARCH PROGRAMS

M.U.R.S.T. Co.Fin. Program (ex40%)

-1991. Discretization methods in structural mechanics

-1992. Discretization methods (FEM-BEM.) 1st cycle

-1993. Discretization methods (FEM-BEM.) 2nd cycle

-1994. FEM modeling for solid walls (elastic phase)

-1995. FEM analysis for solids NRT

-1996. FEM modeling for solid walls (damage phase)

-2002. Mathematical Models for Materials Science

-2003. Identification and physical mechanical characterization of established structural elements from high-performance materials

-2004. Random characterization of structural masonry elements and their analysis

-2005. Advanced models for q.-brittle materials

-2006. Theoretical-experimental study on the mechanics of glass fracture

M.U.R.S.T. R.d.B. Program (formerly 60%)

-1991. Critical loads for thin-walled beams of variable thickness

-1992. FEM modeling for thin wall beams with section variable longitudinally

-1993. FEM modeling for solid walls subject to variable loads 1st cycle

-1994. FEM modeling for NRT solids and variable loads 2nd cycle

-1995. Analysis of structures with unilateral constraints. Theoretical aspects

-1996. Analysis of structures with unilateral constraints. Experimental applications

-1997. Analysis of structures with unilateral constraints. Advanced aspects

-2000. Analysis and control of vibrations of structures subject to environmental excitation

-2007. Advanced computational models for cell damage

-2009. Advanced computational models for cell damage

NATIONAL RESEARCH COUNCIL

-1993. Special project of experimental analysis and numerical modeling of wall structures

-1994. Analysis and modeling of wall structures 1st cycle

-1995. Analysis and modeling of wall structures 2nd cycle

NATIONAL MULTI-FUND OPERATIONAL PROGRAM C.E.E.

-POP. 1994 Mis.4.4. Scientific and technological research. *Subprogram "Structural characterization of artefacts located in archaeological parks aimed at the static consolidation and recovery of the organisms investigated".*

-P.O.P.2000 Axis II° Cultural Resources. *New methodologies for the mechanical and chemical-physical characterization for the diagnosis of the degradation of the materials constituting artefacts of historical interest*.

-PON01 01869: 2007-2013. *Innovative technologies for the defense of the territory and the environment.*

-PON03 PE 00012 1: 2007-2013. *Marine Energy Laboratory MEL: Research and development for the production and transmission of electrical energy in the marine environment.*

-2014-2016: Mediterranean University-Civitavecchia Port Authority-Wave-energy srl agreement. *Study for the development of the green mobility in Civitavecchia harbor through the implementation of the pilot technology REWEC3.*

-2015-2020: Mediterranean University – Italian Air Force General Staff Flight Experimental Center Agreement: *Project manager: Evaluation of the structural integrity for composite elements of the upper-skin of the Eurofigther aircraft.*

-2019-2023: PON 2015-2020. *Use of innovative technologies, materials and models in the aeronautical sector. AEROMAT*

-2019-2022: PRIN 2017 Project Code 2017J4EAYB. *Innovative multi-scales in materials and structures MIMS.*

-2019-2023: PON Targeted topics ARS01 00158. *Innovative technologies and models for risk mitigation in critical infrastructures.*

-2022-2024: PRIN 2022 Prot. 2022AZPLL8. *Integration of Artificial Intelligence and Ultrasonic Techniques for Monitoring Control and Self-Repair of Civil Concrete Structures*

F- PARTICIPATION IN SCIENTIFIC AND RESEARCH ASSOCIATIONS

-Member G.N.F.M. C.N.R. National Physics-Mathematics Group

-Member Society for Natural Philosophy

-Member M.R.S. Materials Research Society

-Member of A.I.A.A. American Institute of Aeronautics and Aerospace

-E.S.B. member European Society of Biomechanics

F1-ORGANIZATION OF SCIENTIFIC EVENTS

2005-" *The Rational Modeling in Materials and Structures*", International Symposium in honor of prof. Giampietro Del Piero for the occasion of his 65th birthday. Faculty of Engineering University of Reggio Calabria June 2005. Member of the scientific committee (with P.Podio-Guidugli, L. Deseri, G.Royer Carfagni). Member of the organizing committee

2006- "*What to do with mechanics, especially if rational*". National workshop with G. Capriz, A. Fasano, G. Del Piero, P. Podio-Guidugli, T. Ruggeri. Reggio Calabria February 2006. - Member of the organizing committee.

2008- MERCEA "*Seismic engineering conference*". International conference. Mediterranean University Reggio Calabria 8-11 July 2008. – Member of the organizing committee

2009- Bio-MEC'09 "*Common frontiers in advanced research in the fields of biology-medicine-engineering".* National conference MECMAT Department University of Reggio Calabria. May 2009. Coordinator of the scientific committee (with L. Iacopino) and vice-president of the organizing committee

2009- "*Mathematical modeling and physical instances granular flows*". IUTAM Symposium Reggio Calabria 14-18 September. - Member of the organizing committee

2016- *New trends in Mechanics*: study day in honor of prof. Gianfranco Capriz on the occasion of his 91st birthday. DICEAM Department Reggio Calabria October 2016 - Member of the organizing committee (with P. Giovine and A. Amodeo)

F2- REVIEWER OF SCIENTIFIC PUBLICATIONS

- Fractal Geometry and Nonlinear Analysis in Medicine and Biology OATEXT UK) ISSN 2058-9506.

-Annual Research and Review in Biology. (Science Domain Intern. –UK) ISSN 2347-565X

-Journal of Scientific Research and Reports (Science Domain international UK) 2320-0227

-Journal of Mechanics Engineering and Automation. (SAP - USA) ISSN 2163-2405

-Journal of Materials in Civil Engineering. (ASCE USA) ISSN 0899-1561

-Applied and Computational Mechanics. UWB (CZECH) ISSN 1802-680X

-International Journal of Pavements Engineering (Taylor & Francis UK) ISSN 1477-268X

-Current Regenerative Medicine (Bentham Science) ISSN 2468-4252

-International Journal of Pavements: Research and Technology (Elsevier) ISSN 1996-6814

-Journal of Computation and Cognitive Engineering (B. V. Pub. PTE. LTD.) ISSN:2810-9503.

F3- SCIENTIFIC PROJECT EVALUER

1- MIUR: SIR 2014 call for designation for project evaluation:

- code RBSI144BJC: *Understanding mechanical effects of age and diabetes-related glycation in connective tissue.*

- code RBSI14JXNE: *Physical constraints on nuclear organization.*

2- University of Calabria: Call for research grants 2014:

Non-standard investigation on fatigue and fracture behavior in nickel titanium based shape memory alloy.

G_1 – PAPER PUBLICATIONS

1. NJ5-EVOLUZIONE DI METODI E MODELLI PER LA SICUREZZA DEL VOLO, parte 2, Rivista Sicurezza del Volo, n° 358, Stato Maggiore Aeronautica, Roma, 2023. (italian-english)

2. NJ4-EVOLUZIONE DI METODI E MODELLI PER LA SICUREZZA DEL VOLO, parte 1, Rivista Sicurezza del Volo, n°357, Stato Maggiore Aeronautica, Roma, 2023. (italian-english)

3. NJ3-METODOLGIA CREAM ED IMPLEMENTAZIONE PREDITTIVA, parte 2, Rivista Sicurezza del Volo, n° 348, Stato Maggiore Aeronautica, Roma, 2023. (italian-english)

4. NJ2-METODOLGIA CREAM ED IMPLEMENTAZIONE PREDITTIVA, parte 1, Rivista Sicurezza del Volo, n° 347, Stato Maggiore Aeronautica, Roma, 2023. (italian-english)

5. IJ45-A PROPOSED MODEL TO THE FLIGHT SAFETY, in Bevilacqua et al. Eds, NMP 2020, 1-21, Springer Nature Switzerland, 2021.

6. IJ44- DAMAGE INVESTIGATION OF UPPER SKIN COMPOSITE PANEL OF EUROFIGHTER AIRCRAFT (extended version) Key Engineering Materials, 812, 9-16, 2019

7. IJ43- FATIGUE LIFE INVESTIGATION ON WIND BLADES, Annales de Chimie – Science des Materiaux, n°3, 429-440, 2018.

8. IJ42- ADHESION FAILURES IN GRANULAR MIXTURES, in P. Giovine et al.: in Micro to Macro Mathematical Modelling in Soil Mechanics, Trends in Mathematics, Springer, SW, 2018

9. IJ41- MULTISCALE DAMAGE MODELLING ON AERONAUTICAL COMPOSITE UNDER LOW ENERGY IMPACT, Journal of Multy-phase Modelling, vol.9 n° 3, 2018

10. IC54-TOWARD A NEW GENERAL FRAMEWORK TO SAFETY FLIGHT, 6th Annual Safety Forum, Brussels, May 2018.

11. IC53- CREW RESOURCE MANAGEMENT AND FUZZY LOGIC, 6TH Annual Safety Forum, Brussels, May 2018.

12. IC52- DAMAGE INVESTIGATION OVER UPPER SKIN COMPOSITE PANELS OF THE EUROFIGTHER AIRCRAFT, (brief version) AuxDefense2018, 1^ World Conference on Advanced Materials for Defence, Lisbona, sept. 2018

13. IJ40- A FEM SIMULATION OF THE MECHANICAL INTERACTION BETWEEN ASPHALT MIXTURE AND GEOFRID, Key Engineering Materials, Vol.774, 595-600, 2018

14. IJ39- THEORETICAL MODEL TO ADHESION FAILURE IN GRANULAR MATERIALS, Key Engineering Materials, vol.774, 185-190, 2018

15. IJ38- A MULTISCALE MODEL FOR STRESS DISTRIBUTION IN CELLULAR MEMBRANE (second part: Structured deformation theory implementation), FGNAMB Fractal Geometry and Nonlinear Analysis in Medicine and Biology, 2018.

16. IJ37- RUNWAY DEBRIS IMPACT ON AIRCRAFT COMPOSITE PARTS, Key Engineering Materials, 754, 283-286, 2017.

17. IC51- TWO-BAR PLANAR TRUSS WITH NON-LINEAR PRECRITICAL BEHAVIOR: CUSP BIFURCATION, XXIII Conference AIMETA, Salerno 2017.

18. IJ36- A MULTISCALE MODEL FOR STRESS DISTRIBUTION IN CELLULAR MEMBRANE (first part: Introduction and Theoretical Approach), FGNAMB Fractal Geometry and Nonlinear Analysis in Medicine and Biology, vol.2, 2, 1-5, 2016.

19. IJ35-MODELLING DAMAGE TO ASPHALT CONCRETE SURFACE: THEORY AND NUMERICAL APPLICATIONS, ARPN Journal of Engineering and Applied Science, 11, 17, 2016.

20. IC50-LOW ENERGY IMPACT ON THE AERONAUTICAL COMPOSITE, Comsol International Conference, Monaco, 2016

21. IJ34-MORPHOMETRIC ANALYSIS OF CRYOFIXED MUSCULAR TISSUE FOR INTRAOPERATIVE CONSULTATION, Microscopic Research & Technique, 79, 155-161, 2016

22. IJ33-INTERFACES BEHAVIOUR IN GLUED GRANULAR MATERIALS, Key Engineering Materials, Vol. 665, 113-116, 2016

23. IC49- SIMULATION OF THE RESPONSE OF HETEROGENEOUS SOLIDS UNDER DYNAMIC LOADS. COMSOL International Conference, Grenoble, 2015

24. IJ32-IMPACTS DYNAMIC ON GRANULAR PLATE, Journal of Mechanics Engineering and Automation JMEA, Vol. 4, 9, 2014

25. IJ31- REDUCTION OF TRAIN-INDUCED VIBRATIONS BY USING BARRIERS, Research Journal of Applied Sciences, Engineering and Technology 05/2014; 7(17):3623-3632.

26. IJ30- A UNIFIED MODEL FOR MICROMECHANICS DAMAGE IN ASPHALT CONCRETE, Key Engineering Materials Vols. 577-578, 465-468, 2014

27. IJ29- ELECTROMAGNETIC RADIATION IN BIO-TISSUE: A NUMERICAL IMPLEMENTATION, Journal of Biomimetic, Biomaterials Tissue Engineering, vol.18, 1, 2014.

28. IJ28- MODELING MICRO-DAMAGE IN GRANULAR SOLIDS, Key Engineering Materials, Vols. 525-526, 497-500, 2013

29. IC48 – EXPERIMENTAL AND COMPUTATIONAL MATERIAL DEFECTS INVESTIGATION 8TH Eurosim Conference in Modelling and Simulation, Cardiff, 2013 Proceedings, 167-173, 2013

30. IJ27- ULTRASONIC EXAMINATION OF RAILWAY MATERIALS AND NEURAL NETWORK APPROACH TO DEFECTS CLASSIFICATION. Science Series Data Report, 5, 7, 26-35, 2013.

31. IC47- A MICROMECHANICAL MODEL TO HETEROGENEOUS AND COMPLEX SOLID MATERIALS, in Proceedings 28th Intern. Conference Solid Management Philadelphia, Cd-rom, 1060-1066, 2013.

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G_2 - MONOGRAPHIC PUBLICATIONS (in Italian)

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2- *IL COMPORTAMENTO STATICO DELLE STRUTTURE MURARIE,* in Atti del Convegno Ordine Architetti, Reggio Calabria, 1987.

3-*ANTOLOGIA GUIDA AL CORSO DI TIPOLOGIA STRUTTURALE*, Quaderni Didattici, (con M. Lo Sasso e G. Peguiron) Facoltà di Architettura, Reggio Calabria, 1989

4- *LEZIONI DI TIPOLOGIA STRUTTURALE* Quaderni Didattici, (con M. Lo Sasso e G. Peguiron) Facoltà di Architettura, Reggio Calabria, 1989

5- *UNA NORMATIVA PER LE COSTRUZIONI IN MATERIALI TRADIZIONALI,* Convegno Nazionale su "Normativa e Centro Regionale per il Recupero dei Centri Storici Calabresi" Reggio Calabria aprile 1990, Quaderni P.A.U. 6/91, Ed. Rubettino.

6- *STRUTTURE IN ZONA SISMICA: CRITERI PROGETTUALI E NORMATIVI*, in Atti dei cicli seminariali di aggiornamento professionale Ordine Architetti Reggio Calabria, 1991

7- *EC2 LA NORMATIVA EUROPEA PER LA PROGETTAZIONE STRUTTURALE APPLICAZIONE ALLA NORMA NAZIONALE*, in Atti dei seminari di aggiornamento professionale, Ordine Architetti Reggio Calabria, 1998

8- *LA DIAGNOSTICA STRUTTURALE.* In Atti del corso di specializzazione professionale su: "*Restauro Architettonico*", Ordine Architetti Reggio Calabria, 2000.

Professional Design Reference (1982-2000)

From year 2000 deleted from the professional register for university work only. From 2024 live at register of engineers and architects performing professional work with consulting engineering society over structural, aeronautical and safety fields.

• STRUCTURAL DESIGN

From 1982 to 1986 inner to **Italian Railway Company**, gaining great experience in the design of railway routes, station plans, bridges and metal girders, geotechnical works, service buildings. Out organization in the 1987

From 1987 to 2000 **Head of Structural Analysis** consulting and design on steel, reinforced concrete, masonry, building as industrial parts.

-2024: structural designer for the construction of the new headquarters of a construction company in Rome.

• INFRASTRUCTURE DESIGN (Aeronautical selection)

-1987: **So.G.A.S. Aeroporto di Reggio Calabria**: Esecutive design on partial aeropax rebuilding.

-1988: **Aerotrasporti & Servizi S.r.l. Napoli**: Consulting and structural design to Cortina d'Ampezzo Airport.

-1989**: Ente Ferrovie dello stato**: Consulting over Station Renovation in Reggio Calabria Urban Area.

-1989: **Aerotrasporti S.r.l. Reggio Calabria**: Structural Design for aircraft hangar

-1989: **Alimediterranea Scrl. Reggio Calabria**: Design of aircraft hangar, maintenance workshop and service building in Reggio Calabria airport.

-1992: **Soc. Aeroporto Bologna**: Specialist advice to the new aeropax construction management building works (Ing. Legnani)

-1995: **Amm. Comunale Reggio Calabria**: Design and construction supervision for the upgrading and infrastructural adaptation of the Reggio Calabria airport.

-2025: **Regione Calabria**: aeronautical and structural consultancy for the construction of an elevated heliport over the new Morelli hospital in Reggio Calabria.

• GENERAL DESIGN

From 1987 to 2000 carries out design and construction management for residential and / or tertiary buildings located in the province of Reggio Calabria

From 1988 -1996: **Executive structural design** of gyms and sports buildings over Italian country: **Este (PD), Zocca (MO), Latina, Reggio Calabria, Gioia Tauro (RC)**

From 1986 to 1993: HEAD of the FIPAV Sports Installation Commission and member of the Inter-federal CONI Sports Installation Commission.

January 2025

Ing. Arch. Michele Buonsanti