

Office Address:

Room 03-2018, Laboratoire de Mécanique des Solides,
Ecole Polytechnique, 91128 Palaiseau, FRANCE

Tel: (33 1) 69 33 57 98

e-mail: nick@lms.polytechnique.fr, nicolas.triantafyllidis@polytechnique.edu

Education:

- 1981 Ph.D. (Engineering) Brown University, (Providence RI, USA)
- 1980 M.S. (Applied Mathematics) Brown University
- 1978 M.S. (Engineering) Brown University
- 1976 Diploma (Civil Engineering) National Technical University, (Athens, GREECE)

Languages:

Fluent in English, French and Greek

Positions Held:

01/09 – now, C.N.R.S. Directeur de Recherche DR1, Laboratoire de Mécanique des Solides
05/09 – now, Professeur, Département de Mécanique,
Ecole Polytechnique (Palaiseau, FRANCE)

10/80 – 04/09, Assistant, Associate, Full Professor
Aerospace Engineering Dept. & Mechanical Engineering and Applied Mechanics Dept.
The University of Michigan, (Ann Arbor MI, USA)
(now: Emeritus Prof. of Aerospace Engineering & Emeritus Prof. of Mechanical Engineering)

6/03, 6/04, 5/05, 5/06 and 6/07 – 7/07, Visiting Researcher,
CNRS Laboratoire de Mécanique et Acoustique (Marseille, FRANCE)

9/85 – 12/85, 9/87 – 2/88, 9/98 – 1/99 and 1/03 – 5/03, Visiting Professor,
Laboratoire de Mécanique des Solides, Ecole Polytechnique (Paris, FRANCE)

9/94 – 12/94, Visiting Professor,
Division Applied Sciences, Harvard University (Cambridge MA, USA)

6/90 and 5/93, Visiting Professor,
Institut Galilée, Université de Paris Nord (Paris, FRANCE)

3/88 – 7/88, Visiting Scientist,
Research Center of E.D.F. (French National Electricity Board) (Paris, FRANCE)

Industrial Experience:

Consultant: Royal Dutch Shell, K.S.E.P.L., Rijswijk, NETHERLANDS (1988 – 1997)

Consultant: A.L.C.O.A., ALCOA Center PA, USA (1993 – 1998)

Consultant: Peugeot S.A., Paris, FRANCE (1986)

Consultant: Ford Motor Co., Dearborn, MI, USA (1983 – 1986)

Consultant: J.A.R. Associates, Davisville, RI, USA (1980 – 1987)

Awards and Honors:

- 2021 – Appointed member, **French National Mechanics Committee** (IUTAM)
- 2019 Plenary speaker, **APM 2019**, Saint Petersburg, RU, June 24 – 29
67th Summer School and Conference in Advanced Problems in Mechanics
- 2016 – 2020 Appointed Member (Bureau), **National Committee of C.N.R.S., Section 09**
(Mechanics of Solids, Structures, Biomechanics and Acoustics)
- 2015 Plenary speaker, **PACAM 2015**, Urbana-Champaign IL, USA, May 18 – 21
15th Pan American Congress of Applied Mechanics
- 2014 CNRS, **Prix d' Excellence Scientifique**
- 2013 Plenary speaker, **CSMA 2013**, Giens FR, May 13 – 17
11th bi-annual Structural & Computational Mechanics Conference of France
- 2010 CNRS, **Prix d' Excellence Scientifique**
- 2010 **Warner T. Koiter Medal**
A.S.M.E. (American Society of Mechanical Engineers)
- 2010 **Paul Doisteau – Emile Bluet Prize**
French Academy of Sciences
- 2006 Appointed Member of the Editorial Board of the
International Journal of Solids and Structures
- 2003 Fellowship of the C.N.R.S.
Awarded to foreign scientists to pursue research in France
- 2001 Southwest Mechanics Lecture Series Speaker
- 2000 – 2006 Appointed Associate Editor for *Journal of Applied Mechanics (A.S.M.E.)*.
- 1999 Elected to the Board of Governors of S.E.S. (*Society of Engineering Science*)
- 1998 Research Fellowship of the Ecole Polytechnique,
- 1997 Excellence in Research Award,
Aerospace Engineering Department, University of Michigan
- 1996 Elected Fellow of the A.S.M.E.
(American Society of Mechanical Engineers)
- 1987 Fellowship of the C.N.R.S.
Awarded to foreign scientists to pursue research in France
- 1977 **Chrysovergis Prize**, National Technical University of Athens
Awarded to the top graduating student in Civil Engineering (Class size: 250)
- 1976 **University Fellowship**, Brown University
- 1971 – 1976 Prizes (five) of the Technical Chamber of Greece
Awarded annually to the top student in in Civil Engineering (Class size: 250)

Research Areas:

Continuum mechanics; Micromechanics; Structural mechanics; Stability of solids & structures; Numerical methods (FEM); Finite strain problems in elasticity and plasticity related to metal forming; Failure mechanisms in composites and architected materials; Group theoretical methods in bifurcation and stability; Multi-scale problems and related stability issues in solid mechanics; Phase transformations in SMA's; Magneto-electro-mechanical coupling problems in solids; Electromagnetic forming and associated stability problems; Mechanical effects in semiconductors; Stability of structures under high strain rates; Magneto-rheological and nematic elastomers; Liquid crystals, Epitaxial growth on crystals and associated stability problems; Finite strain chemo-poro-mechanics and subcutaneous injection modeling.

Publications in Refereed Journals:

- 1/ "Void Growth and Local Necking of Biaxially Stretched Sheets,"
(with A. Needleman),
Journal Eng. Matls. & Technology, 100, 1978, pp. 164-169.
- 2/ "Effects of Third Order Elastic Constants on the Buckling of Thin Plates,"
(with X. Markenshoff),
Intl. Journal Solids & Structures, 15, 1979, pp. 987-992.
- 3/ "Bifurcation Phenomena in Pure Bending,"
Journal Mech. Physics Solids, 28, 1980, pp. 221-245.
- 4/ "An Analysis of Wrinkling in the Swift Cup Test,"
(with A. Needleman),
Journal Eng. Matls. & Technology, 102, 1980, pp. 241-248.
- 5/ "On the Emergence of Shear Bands in Plane Strain,"
(with R. Abeyaratne),
Intl. Journal Solids & Structures, 17, 1981, pp. 1113-1134.
- 6/ "On the Development of Shear Bands in Pure Bending,"
(with A. Needleman & V. Tvergaard),
Intl. Journal Solids & Structures, 18, 1982, pp. 121-138.
- 7/ "On the Large Deformations of Elastic Materials with Non Elliptic Strain Energy Density Functions,"
(with N. Kikuchi),
Quarterly Appl. Math, 40, 1982, pp. 241-248.
- 8/ "Instabilities of a Finitely Deformed Fiber Reinforced Elastic Material,"
(with R. Abeyaratne),
Journal Appl. Mech., 50, 1983, pp. 149-156.
- 9/ "On the Bifurcation and Postbifurcation Analysis of Elastic-Plastic Solids Under General Prebifurcation Conditions,"
Journal Mech. Physics Solids, 31, 1983, pp. 499-510.
- 10/ "An Investigation of Localization in a Porous Elastic Material Using Homogenization Theory,"
(with R. Abeyaratne),
Journal Appl. Mech., 51, 1984, pp. 481-486.
- 11/ "Surface Instabilities in Finitely Strained Solids Under Static Loading,"
Intl. Journal Eng. Sci., 22, 1984, pp. 1187-1192.
- 12/ "Puckering Instability Phenomena in the Hemispherical Cup Test,"
Journal Mech. Physics Solids, 33, 1985, pp. 117-139.
- 13/ "Effect of Debonding on the Stability of Fiber Reinforced Composites,"
(with J. Barber),
Journal Appl. Mech., 52, 1985, pp. 235-237.
- 14/ "On the Comparison Between Microscopic and Macroscopic Instability Mechanisms in a Class of Fiber Reinforced Composites,"
(with B. Maker),
Journal Appl. Mech., 52, 1985, pp. 794-800.

Publications in Refereed Journals (continued):

- 15/** “Bending Effects on Flow Localization in Metallic Sheets,”
(with S. Samanta),
Proc. Roy. Soc. London, A 406, 1986, pp. 205-226.
- 16/** “Gradient Approach to Localization of Deformation. I – Hyperelastic Materials,”
(with E. Aifantis),
Journal of Elasticity, 16, 1986, pp. 225-237.
- 17/** “An Investigation of Draw Beads in Sheet Metal Forming. I – Theoretical Formulation,”
(with B. Maker & S. Samanta),
Journal Eng. Matls. & Technology, 108, 1986, pp. 321-327.
- 18/** “An Investigation of Draw Beads in Sheet Metal Forming. II – Experimental Results,”
(with B. Maker, J. Grabb & S. Samanta),
Journal Eng. Matls. & Technology, 109, 1987, pp. 164-170.
- 19/** “Thickness Effects on the Stability of Thin Walled Structures,”
(with Y. J. Kwon),
Journal Mech. Physics Solids, 35, 1987, pp. 643-674.
- 20/** “Plastic Bifurcation and Postbifurcation for Generalized Standard Continua,”
(with S. Q. Nguyen),
Journal Mech. Physics Solids, 37, 1989, pp. 545-566.
- 21/** “An Experimental Verification of the Hemispherical Cup Puckering Test,”
(with M. Donoghue, Y. J. Kwon & R. Stevenson),
Journal Eng. Matls. & Technology, 111, 1989, pp. 248-254.
- 22/** “Scale Effects in the Optimal Design of a Microstructured Medium Against Buckling,”
(with M. P. Bendsøe),
Intl. Journal Solids & Structures, 26, 1990, pp. 725-741.
- 23/** “Quelques Remarques sur l’ Homogenisation des Materiaux Elastiques Nonlineaires,”
(with G. Geymonat & S. Muller),
Comptes Rendus de l’ Academie des Sciences de Paris, Ser. I, 311, 1990, pp. 911-916.
- 24/** “Interfacial Instability of Density-Stratified Two-Layer Systems Under Initial Stress,”
(with F. Lehner),
Journal Mech. Physics Solids, 41, 1993, pp. 117-142.
- 25/** “On Stability and the Worst Imperfection Shape in Solids with Nearly Simultaneous Eigenmodes,”
(with R. Peek),
Intl. Journal Solids & Structures, 29, 1992, pp. 2281-2299.
- 26/** “Worst Shape of Imperfection for Space Trusses with Many Simultaneous Buckling Modes,”
(with R. Peek),
Intl. Journal Solids & Structures, 29, 1992, pp. 2385-2402.
- 27/** “Homogenization for Nonlinear Elastic Materials, Microbuckling and Loss of Ellipticity,”
(with G. Geymonat & S. Muller),
Archive. Rat. Mechanics and Analysis, 122, 1993, pp. 231-290.
- 28/** “On Higher Order Gradient Continuum Theories in Nonlinear Elasticity Derivation from and Comparison to the Corresponding Discrete Models,”
(with S. Bardenhagen),
Journal of Elasticity, 33, 1993, pp. 259-293.

Publications in Refereed Journals (continued):

- 29/** “Comparison of Microscopic and Macroscopic Instabilities in a Class of Two Dimensional Periodic Composites,”
(with W. Schnaidt),
Journal Mech. Physics Solids, 41, 1993, pp. 1533-1565.
- 30/** “Stability of a Finite-Thickness Frictional Material Layer Resting on a Viscous Half-Space,”
(with Y. Leroy),
Journal Mech. Physics Solids, 42, 1994, pp. 51-110.
- 31/** “Derivation of Higher Order Gradient Continuum Theories in 2,3-D Non-Linear Elasticity for Periodic Lattice Models,”
(with S. Bardenhagen),
Journal Mech. Physics Solids, 42, 1994, pp. 111-139.
- 32/** “Post-Bifurcation and Imperfection Sensitivity of Space Trusses With Many Simultaneous Buckling Bars and a Strongly Nonlinear Prebuckling Solution,”
(with R. Peek),
Eur. Jour. Mech. A/Solids, 14, 1995, pp. 721-745.
- 33/** “The Influence of Scale Size on the Stability of Periodic Solids and the Role of Associated Higher Order Gradient Continuum Models,”
(with S. Bardenhagen),
Journal Mech. Physics Solids, 44, 1996, pp. 1891-1928.
- 34/** “Stability of a Frictional Cohesive Layer on a Viscous Substratum: Variational Formulation and Asymptotic Solution,”
(with Y. Leroy),
Journal of Geophysical Research, B8, 101, 1996, pp. 17795-17811.
- 35/** “Stability of a Frictional Cohesive Layer on a Viscous Substratum: Validity of Asymptotic Solution and Influence of Material Properties,”
(with Y. Leroy),
Journal of Geophysical Research, B9, 102, 1997, pp. 20551-20570.
- 36/** “Stability of Density-Stratified Two-Layers System,”
(with P. Massin & Y. Leroy),
Comptes Rendus de l' Academie des Sciences de Paris, Ser. IIa, 322, 1996, pp. 407-413.
- 37/** “A sufficient Condition for the Linear Instability of Strain-Rate Dependent Solids,”
(with P. Massin & Y. Leroy),
Comptes Rendus de l' Academie des Sciences de Paris, Ser. IIb, 324, 1997, pp. 151-157.
- 38/** “Effects of Scale Size on Media with Periodic and Nearly Periodic Microstructures. – I Macroscopic Properties,”
(with M. Schraad),
Journal Appl. Mech., 64, 1997, pp. 751-762.
- 39/** “Effects of Scale Size on Media with Periodic and Nearly Periodic Microstructures. – II Failure Mechanisms,”
(with M. Schraad),
Journal Appl. Mech., 64, 1997, pp. 762-771.
- 40/** “Onset of Failure in Aluminum Honeycombs Under Arbitrary In-Plane Loading,”
(with M. Schraad),
Journal Mech. Physics Solids, 46, 1998, pp. 1089-1124.

Publications in Refereed Journals (continued):

- 41/** “Asymptotic Analysis of Stability for Prismatic Solids Under Axial Loads,”
(with W. Scherzinger),
Journal Mech. Physics Solids, 46, 1998, pp. 955-1007.
- 42/** “Surface Bifurcation in Anisotropic Materials with Application to Aluminum Alloys,”
(with M. Nestorovic & E. Chu),
Journal Appl. Mech., 66, 1999, pp. 62-68.
- 43/** “On the Stability of Strain-Rate Dependent Solids. – I Structural Examples,”
(with P. Massin & Y. Leroy),
Journal Mech. Physics Solids, 47, 1999, pp. 1737-1779.
- 44/** “On the Stability of Rate-Dependent Solids with Application to the Uniaxial Plane Strain Test,”
(with M. Nestorovic & Y. Leroy),
Journal Mech. Physics Solids, 48, 2000, pp. 1476-1491.
- 45/** “Asymptotic Stability Analysis for Sheet Metal Forming. – I Theory,”
(with W. Scherzinger),
Journal Appl. Mech., 67, 2000, pp. 685-690.
- 46/** “Asymptotic Stability Analysis for Sheet Metal Forming. – II Application,”
(with W. Scherzinger & E. Chu),
Journal Appl. Mech., 67, 2000, pp. 691-696.
- 47/** “Stability of Pressure-Dependent, Thermally-Induced Martensitic Transformations in Bi-Atomic Crystals,”
(with R. Elliott & J. Shaw),
Intl. Journal Solids & Structures, 39, 2002, pp. 3845-3856.
- 48/** “Bifurcation and Stability of an Elastic Plate over an Inviscid and Buoyant Fluid,”
(with Y. Leroy & M. Guiton),
Intl. Journal Solids & Structures, 39, 2002, pp. 3873-3891.
- 49/** “Stability of Thermally-Induced Martensitic Transformations in Bi-Atomic Lattices,”
(with R. Elliott & J. Shaw),
J. Mech. Phys. Solids, 50, 2002, pp. 2463-2493.
- 50/** “Onset of Failure in Finitely Strained Layered Composites Subjected to Combined Normal and Shear Loading,”
(with M. Nestorovic),
J. Mech. Phys. Solids 52, 2004, pp. 941-974.
- 51/** “Onset of Necking in Electro-magnetically Formed Rings,”
(with J. Waldenmyer),
J. Mech. Phys. Solids 52, 2004, pp. 2127-2148.
- 52/** “On Finitely Strained Magneto-Rheological Elastomers,”
(with S. Kankanala),
J. Mech. Phys. Solids 52, 2004, pp. 2869-2908.
- 53/** “On the Stability of Kelvin Cell Foams Under Compressive Loads,”
(with L. Gong & S. Kyriakides),
J. Mech. Phys. Solids 53, 2005, pp. 771-794.
- 54/** “Failure Surfaces for Finitely Strained Two-Phase Periodic Solids Under Arbitrary Plane Strains,”
(with M. Nestorovic & M. Schraad),
Journal Appl. Mech., 73, 2006, pp. 505-515.

Publications in Refereed Journals (continued):

- 55/** “Stability of Crystalline Solids – I Continuum and Atomic Lattice Considerations,”
(with R. Elliott & J. Shaw),
J. Mech. Phys. Solids 54, 2006, pp. 161-192.
- 56/** “Stability of Crystalline Solids – II Application to Temperature-Induced Martensitic Phase Transformations in a Bi-Atomic Crystal,”
(with R. Elliott & J. Shaw),
J. Mech. Phys. Solids 54, 2006, pp. 193-232.
- 57/** “Forming Limits for Electromagnetically Expanded Aluminum Alloy Tubes: Theory and Experiment,”
(with J. D. Thomas, M. Seth, J. Bradley & G. Daehn),
Acta Materialia, 55, 2007, pp. 2863-2873.
- 58/** “Post-Bifurcation Equilibria in the Plane Strain Test for a Hyperelastic Rectangular Block,”
(with W. H. Scherzinger & H.-J. Huang),
Intl. Journal Solids & Structures, 44, 2007, pp. 3700-3719.
- 59/** “Microscopic and Macroscopic Instabilities in Finitely Strained Porous Elastomers,”
(with J. C. Michel, O. Lopez-Pamies & P. Ponte Castaneda)
J. Mech. Phys. Solids, 55, 2007, pp. 900-938.
- 60/** “Theory of Necking Localization in Unconstrained Electromagnetic Expansion of Thin Sheets,”
(with J. D. Thomas),
Intl. Journal Solids & Structures, 44, 2007, pp.6744-6767.
- 61/** “Surface Instability of an Elastic Half Space with Material Properties Varying with Depth,”
(with D. Lee, J. Barber & M. Thouless),
J. Mech. Phys. Solids, 56, 2008, pp. 858-868.
- 62/** “Magnetoelastic Buckling of a Rectangular Block in Plane Strain,”
(with S. Kankanala),
J. Mech. Phys. Solids, 56, 2008, pp. 1147-1169.
- 63/** “Superelasticity and Stability of a Shape Memory Alloy Hexagonal Honeycomb under In-plane Compression,”
(with P. Michailidis, J. A. Shaw & D. S. Grummon)
Intl. Journal Solids & Structures, 46, 2009, pp. 2724-2738.
- 64/** “On Electromagnetic Forming Processes in Finitely Strained Solids: Theory and Examples,”
(with J. D. Thomas),
J. Mech. Phys. Solids, 57, 2009, pp. 1391-1416.
- 65/** “Comparison of Fully Coupled Modeling and Experiments for Electromagnetic Forming Processes in Finitely Strained Solids,”
(with J. D. Thomas, A. Vivek, G. S. Daehn & J. R. Bradley),
Int. Journal of Fracture, 163, 2010, pp. 67-83.
- 66/** “Microscopic and Macroscopic Instabilities in Finitely Strained Fiber-Reinforced Elastomers,”
(with J.C. Michel, O. Lopez-Pamies & P. Ponte-Castaneda),
J. Mech. Phys. Solids, 58, 2010, pp. 1776–1803.

Publications in Refereed Journals (continued):

- 67/** “Reversible Stress-Induced Martensitic Phase Transformations in a Bi-Atomic Crystal,” (with R. Elliott & J. Shaw), *J. Mech. Phys. Solids*, 59, 2011, pp. 216–236.
- 68/** “Experiments and Modeling of Iron-Particle-Filled Magnetorheological Elastomers” (with K. Danas and S. Kankanala), *J. Mech. Phys. Solids*, 60, 2012, pp. 120–138.
- 69/** “Onset of Failure in a Fiber Reinforced Elastomer Under Constrained Bending” (with E. Lignon and P. Le Tallec), *Intl. Journal Solids & Structures*, 50, 2013, pp. 279–287.
- 70/** “Onset-of-instability in Axially Compressed Honeycomb under General Loading” (with F. Lopez-Jimenez), *Intl. Journal Solids & Structures*, 50, 2013, pp. 3934–3946
- 71/** “Dynamic Stability of Externally Pressurized Elastic Rings Subjected to High Rates of Loading” (with T. Putelat) *Intl. Journal Solids & Structures*, 51, 2014, pp. 1–12
- 72/** “Influence of Interfacial Adhesion on the Mechanical Response of Magneto-rheological Elastomers at High Strain” (with T. Pössinger, L. Bodelot and C. Bolzmacher), *Microsystem Technologies*, 20, 2014, pp. 803–814
- 73/** “Stability of a Magneto-elastic Layer Resting on a Non-magnetic Substrate and Subjected to Magneto-mechanical loading” (with K. Danas), *J. Mech. Phys. Solids*, 69, 2014, pp. 67–83.
- 74/** “Dynamic Stability of a Bar Under High Loading Rate – Response to Local Perturbations” (with K. Ravi-Chandran), *Intl. Journal Solids & Structures*, 58, 2015, pp. 301–308
- 75/** “Piezoresistivity of Thin Film Semiconductors with Application to Thin Film Silicon Solar Cells” (with D. Lange, P. Roca i Cabarrocas and D. Daineka) *Solar Energy Materials & Solar Cells*, 145, 2016, pp. 93–103.
- 76/** “Dynamic Stability of Biaxially Strained Thin Sheets Under High Strain-rates: Response to Local Perturbations” (with G. Wen), *Intl. Journal of Fracture*, 200, 2016, pp. 99–113
- 77/** “Freedericksz Instability for the Twisted Nematic Device: A Three-dimensional Analysis” (with G. Sfyris, K. Danas and G. Wen), *Phys. Rev. E*, 94, 2016, pp. 012704-1–012704-12
- 78/** “Localization of Deformation and Loss of Microscopic Ellipticity in Microstructured Solids” (with M.-P. Santisi d’Avila and G. Wen), *J. Mech. Phys. Solids*, 97, 2016, pp. 275-298
- 79/** “The p–n Junction Under Nonuniform Strains: General Theory and Application to Photovoltaics” (with L. Guin and M. E. Jabbour), *J. Mech. Phys. Solids*, 110, 2018, pp. 54-79
- 80/** “Continuum Electromechanical Theory for Nematic Continua with Application to Freedericksz Instability” (with G. Pampolini), *J. Elasticity*, 132, 2018, pp. 219-242

Publications in Refereed Journals (continued):

- 81/** “Bifurcation Analysis of Twisted Liquid Crystal Bilayers”
(with K. Danas, D. Mukherjee, K. Haldar),
J. Mech. Phys. Solids, 123, 2019, pp. 61-79
- 82/** “Stability of Vicinal Surfaces: Beyond the Quasistatic Approximation”
(with L. Guin, M. Jabbour, L. Shaabani-Ardali and L. Benoit-Marechal),
Physical Review Letters, 124, 2020, pp. 036101-1
- 83/** “Effect of Strains on the Dark Current-Voltage Characteristic of Silicon Heterojunction Solar Cells”
(with L. Guin, P. Roca i Cabarrocas and M. Jabbour),
Solar Energy, 196, 2020, pp. 457-461
- 84/** “Hidden Asymptotic Symmetry in Long Elastic Beams of Softening Foundations”
(with S. Pandurangi and T.J. Healey),
SIAM J. Appl. Math., 80, 2020, pp. 1083-1100
- 85/** “Deformation Patterns and Their Stability in Finitely Strained Circular Cell Honeycomb”
(with C. Combescure and R. Elliott),
J. Mech. Phys. Solids, 142, 2020, pp. 103976
- 86/** “Finding Stable Localized Deformation Solutions Using Group theory – A Nonlinear Beam Model”
(with S. Pandurangi, T.J. Healey and R. Elliott),
J. Elasticity, 142, 2020, pp. 163-199
- 87/** “A Coupled Electromagnetic-Thermomechanical Approach for the Modeling of Electric Motors”
(with N. Hanappier and E. Charkaluk),
J. Mech. Phys. Solids, 149, 2021, pp. 104315
- 88/** “Revisiting Step Instabilities on Crystal Surfaces. Part-I: The Quasistatic Approximation”
(with L. Guin and M. E. Jabbour),
J. Mech. Phys. Solids, 156, 2021, pp. 104574
- 89/** “Revisiting Step Instabilities on Crystal Surfaces. Part-II: The General Theory”
(with L. Guin, L. Shaabani-Ardali and M. E. Jabbour),
J. Mech. Phys. Solids, 156, 2021, pp. 104582
- 90/** “Scaling Laws for Step Bunching on Vicinal surfaces: The Role of the Dynamical and Chemical effects”
(with L. Benoit-Marechal and M. E. Jabbour),
Phys. Rev. E, 104, 2021, pp. 034802-1– 034802-13
- 91/** “Nucleation of Creases in Hyperelastic Solids is Not a Local Bifurcation”
(with S. Pandurangi, A. Akerson, T.J. Healey and R. Elliott),
J. Mech. Phys. Solids, 160, 2022, pp. 104749-1–104749-25
- 92/** “Multiphysics Simulation of Electric Motors with an Application to Stators”
(with N. Hanappier and E. Charkaluk),
Intl. Journal Solids & Structures, 253, 2022, pp. 111406-1–111406-14
- 93/** “The Role of Relative Fluid Velocity for an Objective Continuum Theory of Finite Strain Poroelasticity”
(with L. Gil, and M. Jabbour), *J. Elasticity*, 150, 2022, pp. 151–196

Publications in Refereed Journals (under review):

- 94/** “Stability and Localization of Deformation Delay in Finitely Strained Plates at Arbitrary Strain-Rates”
(with G. Wen, R. Elliott and K. Ravi-Chandran), 2022 (under review)
- 95/** “The Continuum Chemo-poro-mechanics of Subcutaneous Injections”
(with L. Gil, and M. Jabbour), 2022 (under review)
- 96/** “Thermodynamically consistent formulation of step flow growth including elasticity effects”
(with L. Benoit-Marechal and M. Jabbour), 2022 (under review)
- 97/** “Step meandering during epitaxial growth”
(with L. Benoit-Marechal and M. Jabbour), 2022 (under review)
- 98/** “Mechanical behavior of solenoids subjected to electric currents”
(with R. Elliott), 2022 (under review)

Publications in Refereed Proceedings:

- 1/ "The Macroscopic Properties of a Finitely Strained Periodic Porous Elastic Material," (with R. Abeyaratne), *Advances in Aerospace Structures and Dynamics, A.S.M.E., AD-06*, 1983, pp. 53-56.
- 2/ "The Localization of Deformation in Finitely Strained Shells," *Proceedings of the Considere Memorial Symposium, Paris, September 1985*, pp. 115-124.
- 3/ "Large Deflections and Rotations of a Rod Moving Inside a Three-Dimensional Guide Tube," *Bulletin de la D.E.R. de E.D.F., Ser. C (Math. Inform.)*, 2, 1989, pp. 1-10.
- 4/ "On the Bifurcation and Postbifurcation Theory for a General Class of Elastic-Plastic Solids," *Bifurcation and Stability of Dissipative Systems, Ch. 5*, S. Q. Nguyen editor, *C.I.S.M. 327*, Springer 1993, pp. 221-250.
- 5/ "Folding and Localized Faulting in a Frictional, Cohesive Overburden Resting over a Viscous Substratum," (with Y. Leroy), *Aspects of Tectonic Faulting*, Eds. F. K. Lehner, G. Riedmueller & E. Wallbrecher, Springer 1999
- 6/ "Stability of Layered Geological Structures: An Asymptotic Solution," (with Y. Leroy), *IUTAM Material Instabilities in Solids*, Eds. E. van der Giessen and R. de Borst, Delft, J. Wiley 1998, pp. 15-25.
- 7/ "Stability of Dispersive Bi-Atomic Crystals," (with R. Elliott and J. Shaw), *Smart Structures and Materials 2004, Active materials: Behavior and Mechanics* Ed. D. C. Lagoudas, *Intl. Soc. Opt. Engin., Proc. SPIE*, July 2004, 5387, pp. 239-248.
- 8/ "Superelasticity, Shape Memory and Stability of Nitinol Honeycombs Under In-plane Compression", (with P. Mihailidis, J. Shaw, D. Grummon), *Proc. MRS Spring Meeting 2009*
- 9/ "Design Study of Shape Memory Alloy Honeycombs for Energy Absorption," (with D. Grummon, J. Shaw and R. Watkins), *SMASIS2011-5091*, *Proceedings of the ASME 2011 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, September 18-21, 2011, Scottsdale, Arizona*,

Books:

- 1/ "MATERIAL INSTABILITIES AND THE EFFECT OF MICROSTRUCTURE,"
(edited with S. Kyriakides)
Intl. Journal Solids & Structures, 39, 2002 (*Special Volume*)
- 2/ "BRIDGING SCALES IN MECHANICS,"
(edited with K-S Kim and E. van der Giessen)
J. Mech. Phys. Solids, 56, 2008 (*Special Volume*)
- 3/ "STABILITY OF SOLIDS: FROM STRUCTURES TO MATERIALS,"
MEC563 Class Notes, Ecole Polytechnique, Dec. 2009
- 4/ "LENGTH SCALE IN SOLID MECHANICS: MATHEMATICAL & PHYSICAL ASPECTS,"
(guest editor)
J. Mech. Phys. Solids, 97, 2016 (*Special Volume*)

Major Professional Activities:

- Member, National Committee of Mechanics (French Section of of IUTAM) 2021 –
- Member (Bureau), National Committee of CNRS, Section 09 (Mechanics of Solids, Structures, Biomechanics and Acoustics) 2016 – 2021
- Organizer of PS2014 *International Symposium on Length Scale in Solid Mechanics; Mathematical & Physical Aspects*, Institut Henri Poincare, Paris, FRANCE, June 2014
- Organizer of IUTAM2014 Symposium *Thermomechanical-Electromagnetic Coupling in Solids; Microstructural & Stability Aspects*, Institut Henri Poincare, Paris, FRANCE, June 2014
- Secretary for the JEAN MANDEL PRIZE, given bi-annually by Ecole Polytechnique and Ecole des Mines to the most accomplished mechanics researcher in France under 40 years old.
- Co-organizer (with T. J. Healey) of ICTAM2012 sessions on *Stability of Solids*, August 2012, Beijing CN
- Co-Organizer (with A. Constantinescu) of NQS2010 Symposium *Stability & Nonlinear Solid Mechanics* Institut Henri Poincare, Paris, FRANCE, September 2010
- Member of Board of Governors of the S.E.S. (*Society of Engineering Science*) (1999 – 2002)
- Co-Organizer (with S. Kyriakides) of the IUTAM symposium on *Material Instabilities and the Effect of Microstructure*, University of Texas, Austin TX, May 2001
- Associate Editor for the A.S.M.E. *Journal of Applied Mechanics* (2000 – 2006)
- Founding Vice-Chair (1995-1998) and Chair (1998-2001) of the Stability Committee, Applied Mechanics Division of A.S.M.E.
- Co-Organizer (with O. Richmond) of the I.M.M. International Workshop on *Scale Effects and the Stability of Structured Media*, University of California, San Diego CA, June 1994

Courses Taught at Michigan (G: Graduate, U: Undergraduate):

A.E. 314	(Structural Mechanics I) U - junior level
A.E. 315	(Aircraft and Spacecraft Structures) U - junior level
A.E. 414	(Structural Mechanics II) U - senior level
A.E. 416	(Plates and Shells Theory) U - senior level
A.E. 510	(Introduction to Finite Elements) G
A.E. 511	(Advanced Finite Elements) G
A.E. 513	(Foundations of Solid Mechanics) G
A.E. 514	(Nonlinear Continuum Solid Mechanics) G
A.E. 515	(Mechanics of Composite and Microstructured Media) G
A.E. 518	(Introduction to Structural Stability) G
A.E. 519	(Plasticity Theory - with Prof. W. Yang) G
A.E. 614	(Advanced Plates and Shells Theory – with Prof. R. Peek) G
A.E. 618	(Advanced Elastic & Plastic Stability) G
A.E. 714	(Interactive Solids & Structures – with Prof. J. Shaw) G

Courses Taught at the Ecole Polytechnique (M1: Master Level, M2 Doctoral Level):

MEC 557	(Finite Element Method) M1
MEC 563	(Stability of Solids: From Structures to Materials) M1
MEC 592/5	(Mechanics of Materials and Structures) M1
MEC 642/8	(Multiphysics Modeling of Continuous Media – with Prof. M. Jabbour) M2

Doctoral Theses Supervised:

- 1) “On a General Nonlinear theory of Plates and Shells, Formulation and Applications,”
by: K. A. Meroueh,
Defended: April 1984.
- 2) “On Drawbeads in Sheet Metal Forming and
On Instability Mechanisms in Composite Materials,”
By: B. N. Maker,
Defended: February 1987.
- 3) “Thickness Effects on the Stability of Shell Like Structures,”
By: Y. J. Kwon,
Defended: August 1987.
- 4) “Higher Order Gradient Continuum Models for Nonlinear Solids with
Periodic Microstructure and Their Application to Failure by Localized Deformation,”
By: S. G. Bardenhagen,
Defended: May 1994

Doctoral Theses Supervised (continued):

- 5) "On the Local and Global Instability of a Class of Two Dimensional Periodic Composite Structures,"
By: W. C. Schnaidt,
Defended: Nov. 1994
- 6) "On the Stability of Strain-Rate Dependent Structures and Solids with Applications,"
By: P. A. Massin,
Defended: Nov. 1994
- 7) "Instability Problems with Unidirectional Solidification Process,"
By: G. Yavuz,
Defended: Jan. 1995 (co-chair: Prof. J. Barber, ME & AM Dept.)
- 8) "Effects of Scale Size on the Macroscopic Properties and the Onset of Failure in Microstructured Materials,"
By: M. W. Schraad,
Defended: Aug. 1996
- 9) "Asymptotic Analysis for Nonlinear Stability Problems in Structural Mechanics,"
By: W. M. Scherzinger,
Defended: Sep. 1996
- 10) "On the Influence of Anisotropy, Microgeometry and Deformation Rates on the Stability of Finitely Strained Solids,"
By: N. Nestorovic,
Defended: Oct. 2001
- 11) "Lattice-Level Instabilities in Bi-Atomic Alloys,"
By: R. S. Elliott,
Defended: July 2004, (co-chair Prof. J. Shaw, Aero Dept., University of Michigan)
- 12) "On Finitely Strained Magnetoelastic Solids,"
By: S. V. Kankanala,
Defended: April 2007
- 13) "Fully Coupled Modeling and Numerical Implementation of Electromagnetic and Thermomechanical Loading Processes in Solids,"
By: J. D. Thomas,
Defended: April 2008
- 14) "Shape Memory Alloy Cellular Solids,"
By: P. A. Michailidis,
Defended: August 2009, (co-chair Prof. J. Shaw, Aero Dept. University of Michigan)
- 15) "Experimental Characterization, Modeling and Simulation of Magneto-Rheological Elastomers,"
By: T. Possinger,
Defended: June 2015, (co-chair Dr. C. Bolzmacher, CEA-LIST)
- 16) "Mechanical Loading Effects on the Conductivity of Semiconducting Thin Films: Application to Photovoltaic Cells,"
By: D. Lange,
Defended: September 2015 (co-chair Prof. P. Roca I Cabarrocas, Polytechnique)
- 17) "Stability and Localization of Deformation in Finitely Strained Solids: Static and Dynamic Aspects,"
By: G. Wen,
Defended: September 2016

Doctoral Theses Supervised (continued):

18) “Modeling and Identification of the Constitutive Behavior of Magnetorheological Elastomers,”

By: J-P Voropaieff,

Defended: September 2018 (co-chairs Profs L. Bodelot & K. Danas, Polytechnique)

19) “Electromechanical Couplings and Growth Instabilities in Semiconductors,”

By: L. Guin,

Defended: December 2018 (co-chairs Profs M. Jabbour & P. Roca i Cabarrocas, Polytechnique)

20) “A General Continuum Theory of Finite Strain Chemoporoelasticity with Application to Subcutaneous Injections,”

By: L. Gil,

Defended: December 2020 (co-advised with Prof. M. Jabbour, Polytechnique)

21) “Coupled electro-magneto-thermo-mechanical modeling of electric motors,”

By: N. Hanappier,

Defended: February 2021 (co-advised with Prof. E. Charkaluk, Polytechnique)

22) “Morphological instabilities of vicinal surfaces during epitaxial growth,”

By: L. Benoit-Marechal,

Defended: December 2021 (co-chairs Profs M. Jabbour & P. Roca i Cabarrocas, Polytechnique)

Post-Doctoral Collaborators:

Dr. Guangyang WEN (September 2016 – December 2016)

Dr. Krishnendu HALDAR (with K. Danas; April 2015 – August 2017)

Dr. Christelle COMBESURE (October 2014 – September 2015)

Dr. George SFYRIS (November 2012 – December 2014)

Dr. Francisco LOPEZ-JIMENEZ (October 2011 – October 2013)

Dr. Thibaut PUTELAT (September 2010 – April 2013)

Dr. Gianpiero PAMPOLINI (November 2010 – October 2011)

Dr. Maria-Paola SANTISI-D’AVILA (September 2009 – August 2011)

Current Doctoral Students:

Mr. Geoffrey MAGDA (Oct. 2020 –) co-advised with Prof. E. Charkaluk (EP)

Patent:

French patent: N°15 59468 “Specimen for testing magnetorheological elastomers”

Date awarded: December 7, 2018

Assignee: Ecole Polytechnique

Awardees: L. Bodelot, C. Bolzmacher, K. Danas, T. Possinger, N. Triantafyllidis

Funded Projects (US Government):*National Science Foundation:*

“Stability Aspects of Large Inelastic Deformations of Metals,”

Period: Jan. 1982 – Jun. 1984

“Post-Buckling Behavior and Imperfection Sensitivity of Space Frames With Multiple Buckling Modes,” (with Prof. R. Peek)

Period: Jun. 1991 – Jun. 1993

“Experimental and Theoretical Study of Springback in Arbitrarily Shaped Aluminum Panels”

Period: Sep. 1995 – Aug. 1998

“Field Fluctuations, Microstructure Evolution and Coupled Phenomena in Random Heterogeneous Materials,” (with Profs. P. Ponte & K. Bhattacharya)

Period: Jan. 2003 – Dec. 2005

“Thermo-mechanical Instabilities in M-Lattices with Applications to Shape Memory Alloys,” (with Prof. J. Shaw)

Period: Aug. 2004 – Jul. 2007

“Theoretical and Experimental Investigation of Electromagnetically Formed Aluminum,”

Period: Aug. 2004 – Jul. 2007

“Fundamental Experimental and Theoretical Investigation of Finite Strain, High Strain-Rate Electromagnetic Loading Processes in Metals,”

Period: May 2009 – Apr. 2012

Air Force Office of Scientific Research:

“Problem of Instability and Scale in Media with Microstructure,”

Period: Sep. 1994 – Aug. 1996

“Instability and Failure in Ductile Solids with Regular Microstructures,”

Period: Jan. 1999 – Aug. 2002

“Cellular Shape Memory Structures: Experiments and Modeling,”

(with Profs J. A. Shaw and D. Grummon)

Period: Jun. 2008 – Jul. 2011

Sandia National Laboratories:

“Research on Microscale Mechanics and their Influence on Macroscopic Response of Materials with Microstructure,” (Several)

Period: Jan. 1999 – Sep. 2007

Funded Projects (US Industry):*Ford Motor Company:*

“Bead Clamping Effects in Sheet Metal Forming,”

Period: Aug. 1983 – May 1987

“Bending Effects in Sheet Metal Forming,”

Period: Jan. 1983 – Dec. 1984

“Magnetoelastic Deformations in Solids,”

Period: Jan. 2001 – Dec. 2001

General Motors Corporation:

“Finite Strain Deformations of a Class of Compressible Rubber Materials,”

Period: Feb. 1983 – Aug. 1986

“Analysis of Surface Waviness Type of Instabilities in Sheet Metal Forming,”

Period: Jun. 1984 – May 1987

“Springback Problems in Sheet Metal Forming,” (Jointly with ALCOA)

Period: Mar. 1992 – Dec. 1992

“Theoretical Study of the Electromagnetic Formability of Automotive Alloys,”

Period: Jan. 2003 – Dec. 2007

Aluminum Corporation of America:

“Unrestricted Gifts for Research in Mechanics of Materials,” (several)

Period: Aug. 1990 – Aug. 2003

“Springback Problems in Sheet Metal Forming,” (Jointly with GM)

Period: Mar. 1992 – Dec. 1992

Funded Projects (France):*CEA (various branches):*

“Experimental and Theoretical Studies of Magnetorheological Elastomers,”

Period: Jan. 2012 – Apr. 2015

“Stability of Solids and Structures Under High Strain Rates,”

Period: Jan. 2012 – Dec. 2015

B & D Medical (FRANCE):

“The Mechanics of Injection in Subcutaneous Tissue,” (Thesis CIFRE)

Period: Oct. 2017 – Sep. 2020