CURRICULUM VITAE

Emil Manoach

Head of Department "Mechanics of Solids"
Bulgarian Academy of Sciences
Acad. G. Bonchev Street , Building 4
1113 Sofia , Bulgaria
Phone: +359 2 9796420
Fax: + 359 2 8707498
E-mail: e.manoach@.imbm.bas.bg

Scientific secretary of Bulgarian Academy of Sciences, responsible for scientific direction "Information and communication sciences and technologies
15 November street, 1.
1040 Sofia, Bulgaria
Phone: + 359 2 979 52 14

EDUCATION AND QUALIFICATIONS

1982-1985 - Faculty of Mathematics and Mechanics, Sofia University
Post graduate training (Ph.D. program),. Title of the thesis: Free vibrations of systems circular plates - tubes, applicable in nuclear energetic technologies.

1975-1980 - Faculty of Mathematics and Mechanics, Sofia University,
M.Sc. thesis in Mechanics.

CAREER/EMPLOYMENT

2017 – present: Scientific secretary of Bulgarian Academy of Sciences, responsible for scientific direction "Information and communication sciences and technologies

2015-present: Head of Department "Mechanics of Solids"

2013- present: Bulgarian Academy of Sciences, Institute of Mechanics, Full Professor

2010 – 2012:– Lublin University of Technology, Lublin, Poland – Senior Researcher

2000 – 2011: Bulgarian Academy of Sciences, Institute of Mechanics, Head of the "Mechanics of Continuous Media" Department.

1998 – 2010: Bulgarian Academy of Sciences, Institute of Mechanics, Director

1996 - 1998: Bulgarian Academy of Sciences, Institute of Mechanics, Vice Director

1995 - 2013: Bulgarian Academy of Sciences, Institute of Mechanics, Associate Professor

1990 - 1995: Bulgarian Academy of Sciences, Institute of Mechanics, Research Associate

1987 - 1989: Bulgarian Academy of Sciences, "Precise Mechanics" Laboratory, Scientific Secretary

1985-1989: Bulgarian Academy of Sciences, Center of Mathematics and Mechanics,. "Precise Mechanics" Laboratory, Research Associate

1981-1982 Civil Engineering Cybernetics Institute, Mathematician

SPECIALIZATION

(i) main field

Non-linear Solid Mechanics, Dynamic of Structures, Structural Health monitoring, damage detection

(ii) other fields

Biomechanics, Numerical Methods, Finite Element Analysis, Composite Materials

(iii) current research interest

Non-linear Dynamics of Structures, Coupled problems, Vibration methods of damage detection

MEMBERSHIP OF PROFESSIONAL SOCIETIES

Governing body of the Bulgarian Academy of Sciences
Bulgarian Union of Scientists,
Bulgarian Union of Mathematicians,
National Scientific Council of Mechanics,
General Assembly of the Bulgarian Academy of Sciences,
Scientific Council of the Institute of Mechanics (**Chairman**),
National Scientific Council of Mechanics of Structures.
National Scientific Council of Applied Mathematics and Mechanics

MAIN INTERNATIONAL PROJECTS:

2019-2023	COST Action CA18202 (European Cooperation in Science and Technology Action) : Optimising Design for Inspection . (Member of the Management Committee)
2015-2019	H2020 project MSCA-ITN-2014-ETN: Marie Skłodowska- Curie Innovative Training Networks (ITN-ETN) MIGRATE - http://www.migrate2015.eu/
2010-2012	Experienced researcher in the project FP-7 245479 CEMCAST project of the Lubin University of Technology
2008-2012	FP7 Networks for Initial Training (ITN) "Gas Flows in Micro Electro Mechanical Systems" GASMEMS . https://cordis.europa.eu/project/rcn/88287/factsheet/en
2009-2010	Royal Society of Edinburgh grant (coordinated by Prof. I. Trendafilova , University of Strathclyde, UK)
2006-2008	**Principle investigator** - Royal Society Scheme - International Joint Project 2006/R2 *Increasing the safety of nonlinear vibrating thermally loaded structures* –
2008-2010	FP6 program of European Union project: EGEE-III Enabling Grids for E-

sciencE-III) ,

2006-2008 FP6 program project: EGEE-II of European Union project (Enabling Grids for E-sciencE-II) Contract Number 031688

2005-2007 Project coordinator (**Principle investigator)** of NATO Colaborative Linkage Grant**. Preventing Disasters from Collapse of Aircraft Structures using vibration based health monitoring** (with UK and Poland).

2004 - **Principal investigator** in **Multi-Material Micro Manufacture: Technologies and Applications -4M Network of Excellence in 6th Framework program of EC, coordinated by Cardiff University, UK**

2003 **COBASE 2002 PROJECT DEVELOPMENT & INITIATION VISITS, NSF, USA** Thermoelastic large amplitude vibrations of thin-walled structures (fellowship supported by *National Science Foundation*-USA) : August -September 2003

2002-2003 **NATO scholarship in** CENUME, IDMEC - Pólo FEUP, Porto, Porugal **Thermoelastic large amplitude vibrations of beams**

1998 -2000 **NATO Linkage Grant** "**Mechanical Analysis of the Stent/Artery System**" with, Florida International University, Miami, USA, Brown Gray School of Medicine, Wake Forest University, Winston Salem, USA.

RECENT BULGARIAN PROJECTS:

2019-2023 Theoretical study of rarefied gas flows without and with chemical reactions and the related interaction of gas-elastic elements in micro / nano systems. Project with Bulgarian research fund (NRF). 50 000 EUR

2018 -2024 **Principal Investigator of the Institute of Mechanics' team** of the CENTRE OF EXCELLENCE IN INFORMATICS AND INFORMATION AND COMMUNICATION TECHNOLOGIES (BG05M2OP001-1.001-0003) funded through the Operational Program "Science and Education for Smart Growth". The total amount of the grant is BGN 29 355 861 (more than15 M euro): BGN 24 952 482 (85%) are provided by the European Regional Development Fund and BGN 4 403 379 (15%) are the national co-financing. Funding for the Institute of Mechanics – 250 000 EUR

2018- **Principal Investigator of the Institute of Mechanics' team** of the National Centre for Distributed and parallel computing contract according to the National Road Map project for scientific equipment – Ministry of Science and Education , Bulgaria - ≈ 400 000 EUR.

2016-2020 Theoretical study of unsteady gas flows in micro/nano systems. Project DN 02-7 /2016 with Bulgarian research fund (NRF). 50 000 EUR

2009-2017

	Principle investigator from the partner organization IMech at the project NSF Grant DUNK-01/3 coordinated by Technical University of Sofia. Principle investigator of A Work-package of the project DCVP 02/1 – "Super computers applications" with NRF coordinated by IICT-BAS, Sofia
2009-2014	
	Principle investigator of from the partner organization IMech at the project DCVP 02/1 – "Super computers applications" with NRF
2005-2008	coordinated by IICT-BAS, Sofia.
	Principal Investigator of the project TH-1518/05 Nonlinear vibrations of thin-walled structures, applicable in aviation and methods for damage detections
2001 - 2005	**Principal Investigator** of the project TH-1103/01 Dynamic and stability of thin-walled structures subjected to thermal and mechanical loading

Principal Investigator of several projects with Bulgarian industrial companies

Conference organization

- Member of the Scientific committee of the 2021 International Conference on Infrastructural Diagnosis, Prognosis and Management (IDPM2021) April 16-18, 2021. Nanjing, China: http://www.icidpm.com/committee/
- Member of the Steering Committee and Scientific committee on "International Conference on Engineering Vibration" Aberdeen, Scotland, UK , 18-21 August, 2020. (https://icoev.org/icoev2020/about-us/organisation.html)
- Chair of the organizing committee of the "***International Conference on Engineering Vibration***" Sofia, 4-7 Spetember, 2017 (www.icoev2017.org)
- International Conference „ACOUSTICS AND VIBRATION OF MECHANICAL STRUCTURES"May 2015, May 2017, May 2019 TIMIŞOARA ROMÂNIA – member of the Scientific committee. http://www.mec.upt.ro/meca/avms/main.php
- Fourth International Conference on Recent Advances in Nonlinear Mechanics, May 2019, https://ranm2019.p.lodz.pl/ member of Scientific committee.
- EUROMECH colloquium 515 "ADVANCED APPLICATIONS AND PERSPECTIVES OF MULTIBODY SYSTEM DYNAMICS" July 13 - 16, 2010, Blagoevgrad, Bulgaria
- 26th INTERNATIONAL SCIENTIFIC CONFERENCE *65 YEARS FACULTY OF MACHINE TECHNOLOGY* 13-16 September, 2010, Sozopol, BULGARIA
- Chairman of 11th Congress on Theoretical and Applied Mechanics, Borovets, 2009
- Co-chairman of 10th Jubilee congress on Theoretical and Applied Mechanics, Varna, 2005
- Co-chairman of 9th Congress on Theoretical and Applied Mechanics, Varna, 2001

- Organizing committee of HADMAR 2001 Euro-Conference , Varna 2001,
- Organizing committee of PRAKTRO-International conference Varna 2003 and Varna 2005
- Organizing committee of Euro Summer School on Biorheology and 12th European Conference on Clinical Hemorheology, Varna and Sofia 2003.
- Organizing Committee of 1st – 3rd Bulgarian-Baltic Conferences , Varna 2000, 2001, 2004

Editorial Activities:

Editor of vol. 148 Int. Conf. of Eng Vibration (ICoEV2017) of MATEC Web of Conferences https://www.matec-conferences.org/articles/matecconf/abs/2018/07/contents/contents.html

Guest Editor of the special issue of the European Physical Journal – Special topics Volume 224, Issue 14-15, 1 November 2015, Nonlinear and multiscale dynamics of smart materials in energy harvesting (together with G. Litak and E. Halverston).

Guest Editor of" International Journal of Structural Stability and Dynamics", Volume 14, Issue 8, 20 November 2014, (together with G. Litak and G. Abadal)

.

Guest Editor of the special issue of the European Physical Journal – Special topics Volume 222, Issue 7, September 2013,

Member of the Editorial board of ***Advances in Acoustics and Vibrations*** journal, Hindawi, http://www.hindawi.com/journals/aav/editors.html

Member of the Editorial board ***Applied Commuter Science***, LUT, Institute of Technological Systems of information, Lublin, Poland. (ISSN 1895-3735)

Member of the Editorial board Technological complexes: http://t-komplex.net.ua/editorial (I SSN 2304-4519 (Print), ISSN 2312-0584 (Online)

Recognition as an Exemplary Reviewer for ***Journal of Sound and Vibrations*** (2011).

Editor of the Proceedings of 9th, 10 and 11th National Congresses on Theoretical and Applied Mechanics.

Selected Papers

of Dr. Emil Manoach

.

1. Manoach E., Doneva S., Warminski J. (2020) Coupled, Thermo-elastic, Large Amplitude Vibration of Bi-material Beams. In: Altenbach H., Chinchaladze N., Kienzler R., Müller W. (eds) Analysis of Shells, Plates, and Beams. Advanced Structured Materials, vol 134. Springer, Cham
2. Shterev, K., **Manoach, E**., Stefanov, S. Hybrid numerical approach to study the interaction of the rarefied gas flow in a microchannel with a cantilever. (2019) International Journal of Non-Linear Mechanics, 117, art. no. 103239
3. **Manoach**, **E.,** Warminska, A., Warminski, J., Doneva S. A reduced multimodal thermoelastic model of a circular Mindlin plate . International Journal of Mechanical Sciences, Volumes 153–154, April 2019, pp 479-489
4. Cui, L., **Manoach, E**., Xu, W., Pan, L.X., Cao, M.S. Nonlinear crack assessment method in beams based on bispectrum-normal cloud model. (2019) Vibroengineering Procedia, 28, pp. 30-34.
5. Manoach, E., Cao, M., Doneva, S. Vibration based methods for damage detection of plates. (2018) AIP Conference Proceedings, 1922, art. no. 100014 . DOI: 10.1063/1.5019099
6. Xu, Y.M., Ding, K.Q., Cao, M.S., **Manoach, E**. Bispectral dynamics features for characterizing structural fatigue damage. (2018) Journal of Vibroengineering, 20 (5), pp. 2073-2084.
7. M. S. Cao, X. Zhu, W. Xu, X. M. Li, H. Xu, **E. Manoach**. Detection of debonding in steel-reinforced bridges using wavelet curvature features of laser-measured operating deflection shapes. Journal of vibroengineering. May 2017, 19, (3),pp. 1845-1853 (ISSN 1392-8716)
8. **Manoach**, **E. ,** Warminski, J., Kloda, L., Teter, A. Numerical and experimental studies on vibration based methods for detection of damage in composite beams. Composite structures, 170 (2017) 26–39.
9. **Manoach**, **E.,** Warminski J., Kloda, L., Teter, A. Vibration Based Methods For Damage Detection In Structures, MATEC Web of Conferences, Volume 83, 0507, (2016) (6 pages)
10. **Manoach**, **E. ,** A. Warminska, J. Warminski, "Dynamics of Beams under Coupled Thermo-Mechanical Loading", Applied Mechanics and Materials, Vol. 849, pp. 57-64, 2016

11. Warminska, E. Manoach, J. Warminski .Dynamics of a Circular Mindlin Plate under Mechanical Loading and Elevated Temperature, Article in MATEC Web of Conferences 83:05013, 2016

12. Warminska, **E. Manoach**, J. Warminski , Vibrations of a composite beam under thermal and mechanical loadings Procedia Engineering 144 (2016) 959 – 966 doi: 10.1016/j.proeng.2016.05.123 (0.24)

13. Stoykov, S., **Manoach**, **E.** Electro-mechanical coupling of rotating 3D beams, MATEC Web of Conferences 83:05011 • January 2016

14. Litak, G., **Manoach, E**., Halverson, E.. Nonlinear and multiscale dynamics of smart materials in energy harvesting. European Physical Journal - Special Topics, 224 (14-15), (2015) , pp. 2671-2673 . ISSN:1951-6355 (print version),

15. **Manoach, E**., Warminski, J., Warminska, A.. Large amplitude vibrations of heated Timoshenko beams with delamination. Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science, 230, 1, 230 (1), pp. 88-101 SAGE, 2015, ISSN:09544062, DOI:10.1177/0954406215570702,.

16. Stoykov, S., **Manoach, E.**, Litak, G.. Vibration energy harvesting by a Timoshenko beam model and piezoelectric transducer.. European Physical Journal - Special Topics, 224, Springer, 2015, ISSN:1951-6355 (print version), DOI:10.1140/epjst/e2015-02587-3, 2755 - 2770

17. Stoykov, S., **Manoach, E**., Margenov, S.. An efficient 3D numerical beam model based on cross sectional analysis and Ritz approximations. ZAMM-Journal of Applied Mathematics and Mechanics, Willey-VCH Verlag GmbH & Co. KGaA, Weinheim, 2015, ISSN:00442267, DOI:10.1002/zamm.201400139, Volume 96, Issue , pp. 791–812,

18. Warminska, A., **Manoach, E**., Warminski, J., Samborski, S.. Regular and chaotic oscillations of a Timoshenko beam subjected to mechanical and thermal loadings. Continuum Mechanics and Thermodynamics, 27, 4, Springer, 2015, ISSN:0935-1175, 719 - 737.

19. Warminska, A., **Manoach, E**., Warminski, J. Nonlinear dynamics of a reduced multimodal Timoshenko beam subjected to thermal and mechanical loadings. Meccanica, DOI 10.1007/s11012-014-9891-3

20. **Manoach, E**., Warminski, J., Mitura, A., Samborski, Dynamics of a laminated composite beam with delamination and inclusions. European Physical Journal – Special Topics. 222 (2013), pp.1649-1664. (IF: 1.562. ISSN: 1951-6355)

21. Litak G., **Manoach, E**. Dynamics of composite nonlinear systems and materials for engineering applications and energy harvesting - The role of nonlinear dynamics and complexity in new developments, European Physical Journal – Special Topics, 222, (2013), 1479-1482, (ISSN: 1951-6355,)

22. **Manoach, E**., Warminski, J., Mitura, A., Samborski, S. Dynamics of a composite Timoshenko beam with delamination. Mechanics Research Communications 46 (2012), pp. 47-53. . ISSN: 00936413

23. **Manoach, E**., Samborski, S., Mitura, A., Warminski, J Vibration based damage detection in composite beams under temperature variations using Poincare´ maps. Int.J. Mechanical Sciences. 62 (2012) 120–132. ; (ISSN:0020-7403)

24. **Manoach, E**., Samborski, S., Mitura, A., Warminski, J, Vibration and damage detections of composite beams with defects . Transactions of the Institute of Aviation (Poland), No 218, 44-53, (2011) ISSN 0509-6669

25. Trendafilova I, **Manoach,** E, (2012) Vibration-based methods for structural and machinery fault diagnosis based on nonlinear dynamics tools, book chapter in Fault Diagnosis in Robotic and Industrial Systems, iConcept press, Ltd. ,(Eddited by Germanos Rigatos), ISBN (Hardcover), 978-0980733099,

26. **Manoach, E**. Trendafilova, . Damage detections in nonlinear vibrating thermally loaded plates. Book chapter in "Materials with Complex Behaviour" by Silva, L. F. Martins da; Altenbach, H. (Eds.) , pp. 193-212, 2010 Springer, Germany. ISBN: 978-3-642-12666-6.

27. **E. Manoach**, Damage detections in nonlinear vibrating, thermally loaded structures, Journal of Theoretical and Applied Mechanics, 39 (4), pp. 39-52, (2009)

28. Trendafoilova I, Gorman, D.G and **Manoach, E.** An investigation on vibration-based damage detection in circular plates. Structural Health Monitoring Int. Journal. 8 (4), pp. 291-302 (2009)

29. Israr, M. Cartmell, **E. Manoach**, I. Trendafilova, W. Ostachowicz,M. Krawczuk A. Zak. Analytical modelling and vibration analysis of partially cracked rectangular plates with different boundary conditions and loading. J. Appl. Mech. 76 (1), pp. 1-9, (2009)

30. **Manoach, E.,** Trendafilova, I., Large amplitude vibrations and damage detection of rectangular plates. Journal of Sound and Vibration, 315 (3) (2008), pp. 591-606.

31. Trendafilova, I., **Manoach, E.,** Vibration Based Damage Detection in Plates by Using Time Series Analysis, Mechanical Systems and Signal Processing, 22 (5), pp. 1092-1106, (2008)

32. Trendafilova, I., **Manoach, E.,** Cartmell, M.P., Ostachowicz, W., Zak, A. An investigation on damagedamage detection in aircrafts panels using nonlinear time series analysis 2007 Key Engineering Materials 347, pp. 213-218

33. Grabowska, J., Palacz, M., Krawczuk, M., Ostachowicz, W., Trendafilova, I., **Manoach, E.,** Cartmell, M. Wavelet analysis for damage identification in composite structures 2007 Key Engineering Materials 347, pp. 253-258

34. I.Trendafilova, **E. Manoach**, M.P.Cartmell, M.Krawczuk, W.M.Ostachowicz, M.Palacz, On the problem for damage detection of vibrating cracked plates. Applied Mechanics and Materials 5-6, pp. 247-254 (2006)
35. Isar, M. Cartmel, M.Krawczuk, W..Ostachowicz, **E.Manoach**, I.Trendafilova, E.V.Shiskina and M.Palacz, On Approximate Analytical Solutions for Vibrations in Cracked Plates. Applied Mechanics and Materials 5-6, pp. 315-322 (2006
36. P. Ribeiro, **E. Manoach**, The effect of temperature on the large amplitude vibrations of curved beams, J. Sound & Vibrations vol. 285 pp. 1093-1107 (2005). (IF: 1.857)
37. **E. Manoach** , P. Ribeiro, Coupled, thermoelastic, large amplitude vibrations of Timoshenko beams. Int. J. Mechanical Sciences, vol. 46, pp. 1589-1606 (2004
38. Joel L. Berry, **E. Manoach**, C.i Mekkaoui, P.H. Rolland, J. E. Moore, Jr., and A. Rachev. Hemodynamics and Wall Mechanics of a Compliance Matching Stent: In Vitro and In Vivo Analysis, Journal of Vascular and Interventional Radiology Vol. 13, pp.97-105 (2002)
39. Rachev, **E. Manoach**, J. Berry, J. Moore Jr., A Model of Stress-Induced Geometrical Remodeling of Vessel Segments Adjacent to Stents and Artery/Graft Anastomoses. Journal of Theoretical Biology. 206, 429-443 (2000).
40. **E. Manoach**. Dynamic large deflection analysis of elastic-plastic structures. Journal of Theoretical and Applied Mechanics , Vol. 29 , pp.45-59 (1999)
41. **E. Manoach**, M. Ferman, Coupled thermo-elastic large amplitude vibrations nonlinear vibrations of beams subjected to thermal and mechanical loadings. In Proc. of Int. Conference on *Nonlinear Problems in Aviation and Aerospace ICNPAA* 2004: Mathematical Problems in Engineering and Aerospace Science. June 2-4, Timisoara, Romania, Cambridge Scientific Publishers, pp. 423-431.
42. **E. Manoach** , Large amplitude vibrations of Timoshenko beams subjected to thermal loading. *8th International Conference on Recent Advances in Structural Dynamics,* July 2003, Southampton, UK. CD-paper 39 (10 pages) (2003)
43. **E. Manoach**, D. Karagiozova, L. Hadjikov, An inverse problem for an initially heated circular plate under a pulse loading. ZAMM (Applied Mathematics and Mechanics). Vol. 71, (1991), pp.413-416.
44. V. Sainov, E. Simova and **E. Manoach**. Plate Bending Investigation by Comparative Holographic Moire Interferometry. Evaluation by Finite Element Method. Optics and Lasers in Engineering Vol. 11, (1989), pp.15-25.
45. **E. Manoach**. Dynamic large deflection analysis of elastic-plastic Mindlin circular plates. International Journal of Non-Linear Mechanics, Vol. 29, (1994) pp. 723-735.
46. **E. Manoach** and D. Karagiozova. Dynamic response of thick elastic-plastic beams. International Journal of Mechanical Sciences. Vol. 35, (1993) pp. 909-919.)
47. **E. Manoach**. Dynamic response of elastoplastic Mindlin plate by mode superposition

method.. Journal of Sound and Vibrations. Vol. 162, (1993), pp.165-175.

48. **E. Manoach** ,D. Karagiozova. Impulse loading of an elastic-plastic beam on an elastic foundation. Computers and Structures. Vol. 45, (1992), pp. 605-612.
49. D. Karagiozova, **E. Manoach**. Coupling effects in an elastic-plastic beam subjected to heat impact. Nuclear Engineering and Design, Vol. 135, (1992),pp. 267-27