

Speaker of Session Mechanics of composite materials

ACOUSTIC WAVE PROPAGATION IN (LAYERED) MAGNETOELECTROELASTIC (COMPOSITE) MATERIALS AND INFLUENCE OF GRAVITATIONAL SUBSYSTEMS



I (Dr. Aleksey Anatolievich Zakharenko) currently work for the International Institute of Zakharenko Waves (IIZWs – www.iizw.ru , E-mail: aazaaz@inbox.ru). As a result, I have discovered ~ 200 new acoustic waves propagating in (layered) piezoelectromagnetic (composite) structures. My PhD was published as a book (A.A. Zakharenko. **Propagation of Seven New SH-SAWs in Piezoelectromagnetics of Class 6 mm**. Saarbruecken – Krasnoyarsk, LAP LAMBERT Academic Publishing GmbH & Co. KG, 84 pages, 2010, ISBN: 978-3-8433-6403-4. This book is available on-line at <https://www.morebooks.de/store/gb/book/propagation-of-seven-new-sh-saws-in-piezoelectromagnetics-of-class-6mm/isbn/978-3-8433-6403-4>) for the IIZWs. I have published ~ 50 research papers in various international journals and 5 books and one chapter in a book, see my my article and book publications below.

My current work is coupled with the development theoretical backgrounds in the research arena (mechanical, electrical, and gravitational engineering) of the acoustic wave propagation in (composite) materials when the mechanical, electrical, magnetic, gravitational, and cogravitational subsystems are coupled. The successful development of this research direction can lead in the future to propellantless spacecrafts and instant interplanetary (interstellar and even intergalactic) communications that can be readily used by the human civilization. My papers can be found on the ResearchGate pages: https://www.researchgate.net/profile/Aleksey_Zakharenko



Publications:

- 1) A.A. Zakharenko. On necessity of development of instant interplanetary telecommunication based on some gravitational phenomena for remote medical diagnostics and treatment. *Canadian Journal of Pure and Applied Sciences (SENRA Academic Publishers, Burnaby, British Columbia, Canada)* **12** (2) (2018); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 2) A.A. Zakharenko. Extra two new piezoelectromagnetic SH-SAWs with dramatic dependence on small electromagnetic constant. *Journal of King Saud University - Science (Production and hosting by Elsevier B.V.)* **30** (3-4) (2018), ISSN: 1018-3647, DOI: <https://doi.org/10.1016/j.jksus.2017.05.005>.
- 3) A.A. Zakharenko. On new interfacial four-potential acoustic SH-wave in dissimilar media pertaining to transversely isotropic class 6 mm. *Canadian Journal of Pure and Applied Sciences (SENRA Academic Publishers, Burnaby, British Columbia, Canada)* **11** (3) 4321 – 4328 (2017); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 4) A.A. Zakharenko. The problem of finding of eigenvectors for 4P-SH-SAW propagation in 6 mm media. *Canadian Journal of Pure and Applied Sciences (SENRA Academic Publishers, Burnaby, British Columbia, Canada)* **11** (1) 4103 – 4119 (2017); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 5) A.A. Zakharenko. On piezogravitocogravitoelectromagnetic shear-horizontal acoustic waves. *Canadian Journal of Pure and Applied Sciences (SENRA Academic Publishers, Burnaby, British Columbia, Canada)* **10** (3) 4011 – 4028 (2016); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 6) A.A. Zakharenko. On discovery of extra four new dispersive SH-waves in magnetoelastoelectric plates. *Canadian Journal of Pure and Applied Sciences (SENRA Academic Publishers, Burnaby, British Columbia, Canada)* **10** (2) 3891 – 3903 (2016); <https://arxiv.org/abs/1804.08717>; ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 7) A.A. Zakharenko. On separation of exchange term from the coefficient of the magnetoelastomechanical coupling. *Pramana – Journal of Physics (Indian Academy of Science)* **86** (6) 1409 – 1412 (2016); DOI: <https://doi.org/10.1007/s12043-015-1171-9>, free on-line access at <http://www.ias.ac.in/pramana>.
- 8) A.A. Zakharenko. On new dispersive SH-waves propagating in piezoelectromagnetic plate. *Open Journal of Acoustics (Scientific Research Publishing, USA)* **5** (3) 122 – 137 (2015); <http://dx.doi.org/10.4236/oja.2015.53011> (free on-line access at <http://www.scirp.org/journal/oja>).
- 9) A.A. Zakharenko. Dramatic influence of the magnetoelectric effect on the existence of the new SH-SAWs propagating in magnetoelastoelectric composites. *Open Journal of Acoustics (Scientific Research Publishing, USA)* **5** (3) 73 – 87 (2015); <http://dx.doi.org/10.4236/oja.2015.53007> (free on-line access at <http://www.scirp.org/journal/oja>).
- 10) A.A. Zakharenko. A study of new nondispersive SH-SAWs in magnetoelastoelectric medium of symmetry class 6 mm. *Open Journal of Acoustics (Scientific Research Publishing, USA)* **5** (3) 95 – 111 (2015); <http://dx.doi.org/10.4236/oja.2015.53009> (free on-line access at <http://www.scirp.org/journal/oja>).
- 11) A.A. Zakharenko. On existence of eight new interfacial SH-waves in dissimilar piezoelectromagnetics of class 6 mm. *MECCANICA (Publisher: Associazione italiana di meccanica teorica e applicata, AIMETA, Italy, Springer Verlag)* **50** (7) 1923 – 1933 (2015); DOI: <https://doi.org/10.1007/s11012-015-0210-4>.
- 12) A.A. Zakharenko. An examination of zero-order modes of plate PEM-SH dispersive acoustic waves: Magnetically open and electrically closed plate sides. *Canadian Journal of Pure and Applied Sciences (SENRA Academic Publishers, Burnaby, British Columbia, Canada)* **8** (3) 3139 – 3145 (2014); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).



- 13) A.A. Zakharenko. Investigation of SH-wave fundamental modes in piezoelectromagnetic plate: Electrically closed and magnetically closed boundary conditions. *Open Journal of Acoustics* (Scientific Research Publishing, USA) **4** (2) 90 – 97 (2014); DOI: <https://doi.org/10.4236/oja.2014.42009> (free on-line access at <http://www.scirp.org/journal/oja>).
- 14) A.A. Zakharenko. Some problems of finding of eigenvalues and eigenvectors for SH-wave propagation in transversely isotropic piezoelectromagnetics. *Canadian Journal of Pure & Applied Sciences* (SENRA Academic Publishers, Burnaby, British Columbia, Canada) **8** (1) 2783 – 2787 (2014); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 15) A.A. Zakharenko. New nondispersive SH-SAWs guided by the surface of piezoelectromagnetics. *Canadian Journal of Pure and Applied Sciences* (SENRA Academic Publishers, Burnaby, British Columbia, Canada) **7** (3) 2557 – 2570 (2013); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 16) A.A. Zakharenko. Fundamental modes of new dispersive SH-waves in piezoelectromagnetic plate. *Pramana – Journal of Physics* (Indian Academy of Science) **81** (5) 819 – 827 (2013); DOI: <https://doi.org/10.1007/s12043-013-0609-1> , free on-line access at <http://www.ias.ac.in/pramana>.
- 17) A.A. Zakharenko. Peculiarities study of acoustic waves' propagation in piezoelectromagnetic (composite) materials. *Canadian Journal of Pure and Applied Sciences* (SENRA Academic Publishers, Burnaby, British Columbia, Canada) **7** (2) 2459 – 2461 (2013); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 18) A.A. Zakharenko. Consideration of SH-wave fundamental modes in piezoelectromagnetic plate: Electrically open and magnetically open boundary conditions. *Waves in Random and Complex Media* **23** (4) 373 – 382 (2013); DOI: <https://doi.org/10.1080/17455030.2013.834396> .
- 19) A.A. Zakharenko. Piezoelectromagnetic SH-SAWs: A review. *Canadian Journal of Pure and Applied Sciences* (SENRA Academic Publishers, Burnaby, British Columbia, Canada) **7** (1) 2227 – 2240 (2013); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 20) A.A. Zakharenko. A study of SH-SAW propagation in cubic piezomagnetics for utilization in smart materials. *Waves in Random and Complex Media* **22** (4) 488 – 504 (2012); DOI: <https://doi.org/10.1080/17455030.2012.727042> .
- 21) A.A. Zakharenko. On propagation problems of new surface wave in cubic piezoelectromagnetics. *Open Journal of Acoustics* (Scientific Research Publishing, Los Angeles, California, USA) **2** (3) 104 – 114 (2012); DOI: <https://doi.org/10.4236/oja.2012.23012> (free on-line access at <http://www.scirp.org/journal/oja>).
- 22) A.A. Zakharenko. On wave characteristics of piezoelectromagnetics. *Pramana – Journal of Physics* (Indian Academy of Science) **79** (2) 275 – 285 (2012); DOI: <https://doi.org/10.1007/s12043-012-0308-3> , free on-line access at <http://www.ias.ac.in/pramana>.
- 23) M. Kolaski, A.A. Zakharenko, S. Karthikeyan, K.S. Kim. Structures, energetics, and IR spectra of monohydrated inorganic acids: *ab initio* and DFT study. *Journal of Chemical Theory and Computation* (Publisher: American Chemical Society) **7** (10) 3447 – 3459 (2011); <https://doi.org/10.1021/ct100428z> .
- 24) A.A. Zakharenko. Phase and group velocities of the surface elementary excitations on the superfluid helium–II surface at low temperatures. *Canadian Journal of Pure and Applied Sciences* (SENRA Academic Publishers, Burnaby, British Columbia, Canada) **5** (3) 1649 – 1655 (2011); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
- 25) A.A. Zakharenko. Analytical investigation of surface wave characteristics of piezoelectromagnetics of class 6 mm. *International Scholarly Research Network (ISRN) Applied Mathematics* (India), **Volume 2011**, Article ID 408529, 8 pages (2011); DOI: <https://doi.org/10.5402/2011/408529> (free on-line access).
- 26) A.A. Zakharenko. New interfacial shear-horizontal waves in piezoelectric cubic crystals. *Journal of Electromagnetic Analysis and Applications* (Scientific Research Publishing, USA) **2** (11) 633 –



- 639 (2010); DOI: <https://doi.org/10.4236/jemaa.2010.211083> (free on-line access at <http://www.scirp.org/journal/jemaa>).
- 27) A.A. Zakharenko. Evidence of scattering of bulk elementary excitations in isotopically pure liquid helium-II at low temperatures. *Waves in Random and Complex Media* **20** (3) 385 – 395 (2010); DOI: <https://doi.org/10.1080/17455030903536572> .
 - 28) A.A. Zakharenko. First evidence of surface SH-wave propagation in cubic piezomagnetics. *Journal of Electromagnetic Analysis and Applications (Scientific Research Publishing, USA)* **2** (5) 287 – 296 (2010); DOI: <https://doi.org/10.4236/jemaa.2010.25037> (free on-line access at <http://www.scirp.org/journal/jemaa>).
 - 29) A.A. Zakharenko. Slow acoustic waves with the anti-plane polarization in layered systems. *International Journal of Modern Physics B (World Scientific, Singapore)* **24** (4) 515 – 536 (2010); DOI: <https://doi.org/10.1142/S0217979210054774> .
 - 30) A.A. Zakharenko. Studying magnetization distribution in magnetic thin films under transversal application of magnetic fields. *Journal of Modern Physics (Scientific Research Publishing, USA)* **1** (1) 33 – 43 (2010); DOI: <https://doi.org/10.4236/jmp.2010.11004> (free on-line access at <http://www.scirp.org/journal/jmp>).
 - 31) A.A. Zakharenko. Acoustic waves with the in-plane polarization in piezoelectric cubic structures. *Canadian Journal of Pure and Applied Sciences (SENRA Academic Publishers, Burnaby, British Columbia, Canada)* **3** (1) 675 – 690 (2009); ISSN: 1715-9997 (free on-line access at <http://www.cjpas.org>).
 - 32) A.A. Zakharenko. Different Zakharenko waves in layered and quantum systems. *Conference Proceedings of the International Commission for Acoustics (ICA2007 Congress, Madrid, Spain)* http://www.sea-acustica.es/WEB_ICA_07/fchrs/papers/phy-08-018.pdf, 4 pages (2007); DOI: <https://doi.org/10.13140/2.1.3607.6483> .
 - 33) A.A. Zakharenko. Creation evidence of the second non-dispersive Zakharenko wave by helium atomic beams in superfluid helium-II at low temperatures. *Pramana – Journal of Physics (Indian Academy of Science)* **69** (4) 617 – 629 (2007); DOI: <https://doi.org/10.1007/s12043-007-0160-z> .
 - 34) A.A. Zakharenko. Studying creation of bulk elementary excitation by heaters in superfluid helium-II at low temperatures. *Journal of Zhejiang University SCIENCE A* **8** (7) 1065 – 1076 (2007); DOI: <https://doi.org/10.1631/jzus.2007.A1065> .
 - 35) A.A. Zakharenko. Creation of bulk elementary excitations in superfluid helium-II by helium atomic beams at low temperatures. *Waves in Random and Complex Media* **17** (3) 255 – 268 (2007); DOI: <https://doi.org/10.1080/17455030601178164> .
 - 36) A.A. Zakharenko. New solutions of shear waves in piezoelectric cubic crystals. *Journal of Zhejiang University SCIENCE A* **8** (4) 669 – 674 (2007); DOI: <https://doi.org/10.1631/jzus.2007.A0669> .
 - 37) A.A. Zakharenko. On cubic crystal anisotropy for waves with Rayleigh-wave polarization. *Non-destructive Testing and Evaluation* **21** (2) 61 – 77 (2006); DOI: <https://doi.org/10.1080/10589750600779704> .
 - 38) A.A. Zakharenko. Different dispersive waves of bulk elementary excitations in bulk superfluid helium-II at low temperatures. *In the CD-ROM Proceedings of the Forum Acusticum, Budapest, Hungary* (2005) pages L79 – L89; DOI: <https://doi.org/10.13140/2.1.3869.7923> .
 - 39) A.A. Zakharenko. Analytical studying the group velocity of three-partial Love (type) waves in both isotropic and anisotropic media. *Non-destructive Testing and Evaluation* **20** (4) 237 – 254 (2005); DOI: <https://doi.org/10.1080/17417530500513665> .
 - 40) A.A. Zakharenko. Dispersive Rayleigh type waves in layered systems consisting of piezoelectric crystals bismuth silicate and bismuth germanate. *Acta Acustica united with Acustica* **91** (4) 708 – 715 (2005).



- 41) A.A. Zakharenko. **Love type waves in layered systems consisting of two piezoelectric cubic crystals.** *Journal of Sound and Vibration (Elsevier)* **285** (4-5) 877 – 886 (2005); DOI: <https://doi.org/10.1016/j.jsv.2004.08.044>.
- 42) C.D.H. Williams, A.A. Zakharenko, A.F.G. Wyatt. **Narrow-angle beams of strongly interacting phonons.** *Journal of Low Temperature Physics* **126** (1-2) 591 – 596 (2002); DOI: <https://doi.org/10.1023/A:1013727403790>.
- 43) Yu.V. Zakharov, A.A. Zakharenko. **Dynamic loss of stability in non-linear problem about cantilever.** *Journal of Computational Technologies (Novosibirsk, Russia)* **4** (1) 48 – 54 (1999) (in Russian; but abstract is in English).
- 44) A.A. Zakharenko. **Dynamic thresholds of stability loss in the non-linear problem about cantilever.** *Vestnik KSTU: Collected science articles of postgraduate and undergraduate students*, KSTU Publishers, Krasnoyarsk, Russia, **9**, 160 – 164 (1997) (in Russian, under supervision of Prof. Yu.V. Zakharov).

Books and book chapters:

- 1) A.A. Zakharenko. **Thirty Two New SH-Waves Propagating in PEM Plates of Class 6 mm.** Saarbruecken – Krasnoyarsk, LAP LAMBERT Academic Publishing GmbH & Co. KG, 162 pages, 2012, ISBN: 978-3-659-30943-4. This book is available on-line at <https://www.morebooks.de/store/gb/book/thirty-two-new-sh-waves-propagating-in-pem-plates-of-class-6-mm/isbn/978-3-659-30943-4>.
- 2) A.A. Zakharenko. **Twenty Two New Interfacial SH-Waves in Dissimilar PEMs.** Saarbruecken – Krasnoyarsk, LAP LAMBERT Academic Publishing GmbH & Co. KG, 148 pages, 2012, ISBN: 978-3-659-13905-5. This book is available on-line at <https://www.morebooks.de/store/ru/book/twenty-two-new-interfacial-sh-waves-in-dissimilar-pems/isbn/978-3-659-13905-5>.
- 3) A.A. Zakharenko. **Seven New SH-SAWs in Cubic Piezoelectromagnetics.** Saarbruecken – Krasnoyarsk, LAP LAMBERT Academic Publishing GmbH & Co. KG, 172 pages, 2011, ISBN: 978-3-8473-3485-9. This book is available on-line at <https://www.morebooks.de/store/gb/book/seven-new-sh-saws-in-cubic-piezoelectromagnetics/isbn/978-3-8473-3485-9>.
- 4) A.A. Zakharenko. **Propagation of Seven New SH-SAWs in Piezoelectromagnetics of Class 6 mm.** Saarbruecken – Krasnoyarsk, LAP LAMBERT Academic Publishing GmbH & Co. KG, 84 pages, 2010, ISBN: 978-3-8433-6403-4. This book is available on-line at <https://www.morebooks.de/store/gb/book/propagation-of-seven-new-sh-saws-in-piezoelectromagnetics-of-class-6mm/isbn/978-3-8433-6403-4>.
- 5) A.A. Zakharenko. **Dispersive SAWs in Layered Systems Consisting of Cubic Piezoelectrics.** Saarbruecken – Krasnoyarsk, LAP LAMBERT Academic Publishing GmbH & Co. KG, 72 pages, 2010, ISBN: 978-3-8433-7523-8. This book is available on-line at <https://www.morebooks.de/store/gb/book/dispersive-saws-in-layered-systems-consisting-of-cubic-piezoelectrics/isbn/978-3-8433-7523-8>.
- 6) A.A. Zakharenko. **Ab Initio Study of Acid Molecules Interacting with H₂O.** Chapter 7 in: *Advances in Chemistry Research*, Editor: James C. Taylor, **Volume 5**, pages 213 – 228, 2010, Nova Science Publishers, Inc.; ISBN: 978-1-61728-773-2. It is available on-line at <https://arxiv.org/abs/1804.05673> and https://www.novapublishers.com/catalog/product_info.php?products_id=15791.



Professional services:

2015-2018: An academic editor for the *Physical Science International Journal* (SCIENCEDOMAIN international, Gurgaon, India).

2016-2018: A member of the board of editorial advisers for the *Canadian Journal of Pure & Applied Sciences* (SENRA Academic Publishers, Burnaby, British Columbia, Canada).

2017: Invited Reviewer for a paper submitted to the *Mechanics Research Communications* (Elsevier).

2017: Invited Reviewer for a paper submitted to the *Acta Acustica united with Acustica* (S. Hirzel Verlag – EAA, European Acoustics Association).

2016, 2015, 2010-2012: Invited Reviewer for several papers submitted to the *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*.

2018-2012: Invited Reviewer for several papers submitted to the *Open Journal of Acoustics* (OJA, Scientific Research Publishing, California, USA).

2015: Invited Reviewer for a paper submitted to the *Zeitschrift fuer Angewandte Mathematik und Mechanik* (Wiley).

2015, 2014: Invited Reviewer for a paper submitted to the *Meccanica* (Italy, Springer Verlag).

2014, 2013: Invited Reviewer for papers submitted to the *Journal of Vibration and Control* (SAGE Publishing).

2014: Invited Reviewer for a paper submitted to the *British Journal of Applied Science & Technology* (BJAST, SCIENCEDOMAIN international, www.sciencedomain.org, see the last pages).

2014: Invited Reviewer for several papers submitted to the *British Journal of Mathematics & Computer Science* (BJMCS, SCIENCEDOMAIN international, www.sciencedomain.org).

2015, 2014, 2013: Invited Reviewer for several papers submitted to the *Physical Science International Journal* and the *Physical Review & Research International* (SCIENCEDOMAIN international).

2013: Invited Reviewer for several papers submitted to the *Journal of Basic and Applied Physics* (JBAP, the World Academic Publishing Co., Limited, Hong Kong).

2017, 2014, 2012, 2006-2009: Invited Reviewer for several papers submitted to the *Journal of Sound and Vibration* (Elsevier).

2014, 2013, 2011: Invited Reviewer for papers submitted to the *IEEE/ASME Journal of Microelectromechanical Systems* (Taylor & Francis).

2011: Invited Reviewer for a paper submitted to the *Canadian Journal of Pure & Applied Sciences* (SENRA Academic Publishers, Burnaby, British Columbia, Canada).



2017, 2016, 2015: Invited Reviewer for papers submitted to the *Journal of Electromagnetic Analysis and Applications* (JEMAA, Scientific Research Publishing, California, USA).

2018-2017, 2010: Invited Reviewer for several papers submitted to the *Journal of Modern Physics* (JMP, Scientific Research Publishing, California, USA).

2013, 2008: Invited Reviewer for papers submitted to the *International Journal of Solids and Structures* (Elsevier).

2007-2008: Invited Reviewer for a paper submitted to the *Acta Mechanica* (ACME).

2006-2009: Invited Reviewer for several papers submitted to the *Waves in Random and Complex Media* (Taylor & Francis).

