FERUZA A. AMIRKULOVA, Ph.D.

Curriculum Vitae

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EDUCATION

Ph.D., Mechanical & Aerospace Engineering, Rutgers University **2014**
Dissertation: "Acoustic & elastic multiple scattering & radiation from cylindrical structures"
Dissertation Committee**:**
Andrew Norris (Advisor), Haim Baruh, Haym Benaroya, Yook-Kong Yong.

M.Sc., Mechanical & Aerospace Engineering, Rutgers University **2011**
Thesis: **"**Dispersion relations for elastic waves in plates & rods"
Committee members**:** Andrew Norris (Advisor), Haim Baruh, Haym Benaroya.

Ph.D., Technique (specializing in Civil Engineering), Samarkand State University **2000**
Dissertation: **"**Nonstationary vibrations of elastic & viscoelastic circular cylindrical shells & their interaction with acoustic medium"
Advisor: Kh. Khudoynazarov

B.Sc.-M.Sc., Mathematics, Samarkand State University, graduated with honors **1995**
GPA: 3.95/4.00 (Specialized in Mathematical Analysis).
Thesis: "Multipoint boundary problems with a parameter for a singular PDE system"
Advisor: H. Mamatkulov

FELLOWSHIPS

Post-doctoral Fellowship	Vassar College	2015-2016
New Brunswick Graduate School Fellowship	Rutgers University	2008-2009
Post-doctoral Fellowship	Samarkand State University	2003-2007
Graduate School Fellowship	Samarkand State University	1995-1998

EXPERIENCE

Faculty, 2018, August – Present
San Jose State University

Faculty, 2016, January- 2018, May
Western New England University

American Association of University Women, 2017 - 2020
Invited fellowship review panelist (2017 – 2018, 2018 – 2019, 2019 – 2020)

Acoustical Society of America, 2018-2019
Chair of Special Session "Design of acoustic metamaterials using optimization and machine learning" at the 178th meeting of the ASA meeting San Diego, CA, 2-6 December 2019
Co-Chair of Special Session "Willis coupling in acoustic metamaterials", the 176th ASA meeting Victoria, BC, Canada, 5-9 November 2018

SV WiE 2019
Co-Chair of Special Session "Machine Learning Applications" at "The 2019 Women in Engineering (WiE) Conference Design Your Future", held at San Jose State University, San Jose CA, March 16 2019

National Science Foundation, 2016, 2019
Invited grant review panelist

Acoustica, 2018
Invited reviewer

Journal of Acoustical Society of America, 2016 - 2017
Invited reviewer

Wave Motion, 2015 – 2017
Invited reviewer

Mechanics Research Communications, 2015 - 2017
Invited reviewer

Computers & Mathematics with Applications, 2016
Invited reviewer

Journal of Sound and Vibration, 2014 – 2015
Invited reviewer

Faculty, 1999-2007
Samarkand State University

ACADEMIC RESEARCH EXPERIENCE

Assistant Professor, San Jose State University, San Jose, CA, August 15 2018- Present
Conducting research on designing metamaterials. Exploring bi-anisotropy in acoustic and elastic media. Studying scattering from Willis coupled cylinders of arbitrary smooth shape using T-matrix approach and numerical integration. Investigating the transmission/reflections in an elastic uniform slab. Designing acoustic devices that control waves in a defined manner using gradient based optimization algorithms and machine learning and deep learning, i.e. reflectors, absorbers, super lenses, cloaks, diffusers. Directing three undergraduate, and three graduate students to work on designing acoustic metamaterials and modeling volume sound diffusers using convolutional neural networks and optimization, exploring the suitability of generative modeling for designing metamaterials. Designing a new graduate level course on Numerical methods and deep learning in engineering.

Assistant Professor, Western New England University, Springfield, MA, January 2016 – 2018, May
Conducted research on designing metamaterials, acoustic diffusers, cloaking devices taking into account multiple scattering effect in cluster. Studied total scattering cross section of cluster of scatterers including multiple scattering effect to develop cloaking device. Collaborated with researches from Rutgers University, Vassar College, FloDesign Inc. and Titeflex Commercial, Inc. Wrote grant proposals to obtain funding for research and facilities. Directed senior design projects on designing acoustic metamaterials and lenses (Luneburg lens, GRIN lens). Consulted projects for FloDesign Inc. Completed "Acoustic Particle Separation R&D for FloDesign Inc." project under a contract from Rolls Royce North America; directed and supervised six undergraduate sophomore and junior engineering students for this project. Directed a research on modeling acoustic scattering problems for undergraduate junior student over summer 2017. Directed 3 undergraduate (junior) research work, and four senior design projects during academic year 2016-2017, and three undergraduate research works, and four senior design projects academic year 2017-2018.

Postdoctoral Fellow, Vassar College, Physics+Astronomy Department, Poughkeepsie, NY March 2015- January 2016
Performed computational acoustics simulations. Modeling geometric diffusers, which enhance the room acoustics properties. Studied acoustic scattering from fractal surfaces generated by random midpoint displacement algorithm, using Combined Field Integral Equation (CFIE) formulation by employing Boundary Element Method (BEM++). Performed parallel computations in AcouSTO with MPI on HPC of Vassar College & XSEDE. Mentored students at Vassar Acoustics Research Lab.

Mechanical & Aerospace Engineering Program, Rutgers University, 2011-2014
Doctoral dissertation research conducted under direction of Dr. Andrew Norris.
Modeled cloaking devices generated by active multipole sources to render an object invisible to incident waves in acoustic & elastic media. Designed metamaterials, resonators & waveguides using multiple scattering theory. Investigated wave propagation & ultrasonic scattering by anisotropic heterogeneous solids. Developed fast parallelization techniques for solving multiple scattering problems. Implemented MATLAB, FORTRAN, & COMSOL simulations for verifications using different solvers, & recursive & iterative algorithms. Performed parallel computations on HPC.

Research Assistant, Rutgers University, Piscataway, NJ, December 2011 - January 2012, July 2012 -June 2013, & July - August 2011
Developed active exterior cloaking devices generated by multipole sources.
Examined dynamic material characterization of ultrasonic acoustic and elastic scattering.

Derived recursive algorithm for impedance matrix for cylindrically anisotropic heterogeneous solid.

Mechanical & Aerospace Engineering Program, Rutgers University, 2008-2011

Master thesis research conducted under direction of Dr. Andrew Norris.

Examined wave propagation in elastic solids and waveguides such as plates, thin rectangular rods, & cylindrical rods. Derived dispersion relations for waveguides. Found recursively the roots of the Rayleigh-Lamb equations using iterative algorithm & symbolic algebra on Maple.

Research Associate (postdoctoral study), Samarkand State University, January 2003 – October 2007

Studied the interaction of structure elements of regular and irregular form with medium & coupled fields. Investigated the stressed-strained state of shell structures under kinematic, dynamic & thermal loadings. (Project for the Center of Science & Technology of Uzbekistan).

Visiting Research Associate, University of California, CEE, Davis, CA, March 2003 - May 2003

Studied energy release rates due to circular arc and penny-shaped cracks. Mentor: N. Sukumar.

Visiting Research Associate, Moscow State University of Civil Engineering, Moscow, June 2000 - June 2001

Examined dynamic interaction of coupled fields with cylindrical structural elements. Analyzed thermo-stressed state of shells with non-stationary heating at the boundary.

Assistant/Associate Professor, Samarkand State University, September 1999 - October 2007

Led senior research projects & thesis, supervised research for MSc thesis, wrote reports & proposals.

Research Associate, Samarkand State University, June 1999 - June 2001

Studied non-stationary wave propagation in cylindrical shells interacting with fluids.

Research Assistant, Samarkand State University, January 1999 - June 1999

Examined non-stationary interaction of cylindrical shells with deformable media.

Visiting Scholar, Moscow State University of Civil Engineering, June 1996-December 1996

Studied non-stationary vibrations of elastic cylindrical shell under kinematic & explosive dynamic loadings. Analyzed high-speed deformation of shells, developed analytical solution for 4^{th}order time dependent PDE.

TEACHING EXPERIENCE

College level

Assistant Professor, San Jose State University, San Jose, CA, August 15 2018- Present

Instructor for the Dynamic Systems Vibration and Control course, 2019 Fall Semester

Teaching lectures and Problem solving sessions, grading exams and quizzes, and holding office hours. Creating active learning activities, including in-class group solving problems and using iClicker.

Prepared syllabus, course policies, exam/quiz questions, lecture notes, and slides. Developed the course webpage on Canvas.

Instructor for the Vibration of Mechanical Systems course, 2019 Spring Semester

Taught lectures, graded exams and quizzes, and held office hours.

Prepared syllabus, course policies, exam/quiz questions, lecture notes, and slides. Developed the course webpage on Canvas.

Instructor for the Dynamic Systems Vibration and Control course, 2018 Fall Semester

Taught lectures, graded exams and quizzes, and held office hours.

Prepared syllabus, course policies, exam/quiz questions, lecture notes, and slides. Developed the course webpage on Canvas.

Assistant Professor, Western New England University, Springfield, MA, January 2016 – 2018, May

Instructor for the Computational Solid Mechanics (graduate level course), 2018 Spring Semester

Developed a new material for a graduate level course on Computational Solid Mechanics using COMSOL Multiphysics and MATLAB, teaching lectures and lab sections, grading exams, holding office hours. Prepared syllabus, course policies. Developed the course Kodiak webpage.

Instructor for the Engineering Mechanics: Dynamics, 2018 Spring Semester

Taught lectures, grading exams, holding office hours, directed undergraduate lab experiments for students' projects. Prepared syllabus, course policies, exam/quiz questions. Developed the course Kodiak webpage

Instructor for the Engineering Mechanics: Statics, 2017 Fall Semester

Taught lectures and recitation classes, held office hours, prepared exam and quiz questions, graded exams. Prepared syllabus, course policies. Developed the course Kodiak webpage.

Instructor for the Engineering Mechanics: Dynamics, 2017 Spring Semester

Taught lectures and recitation classes, prepared exam and quiz questions, graded exams; directed undergraduate lab experiments for students' projects. Developed Kodiak webpage for the course; prepared syllabus/course policies. Gathered material for ABET assessment & evaluation.

Instructor for the Engineering Mechanics: Statics, 2016 Fall Semester

Taught lectures and recitation classes, graded exams, assigned homework on MasteringEngineering at pearsonmylabandmastering.com. Prepared syllabus, course policies, exam and quiz questions. Developed the course Kodiak webpage. Gathered material for ABET assessment & evaluation.

Instructor for the Engineering Mechanics: Dynamics, 2016 Spring Semester

Taught lectures and recitation classes, prepared syllabus, course policies, exam and quiz questions, graded exams Directed undergraduate lab experiments for students' projects. Developed Kodiak webpage for the course

Postdoctoral Fellow, Vassar College, Physics+Astronomy Department, Poughkeepsie, NY August 2015-January 2016

Instructor for the Lab section of Fundamentals of Physics Course.

Taught lab section of Fundamentals of Physics Course. Directed undergraduate lab experiments.

Part Time Lecturer, Rutgers University, Piscataway, NJ, 2015 Spring Semester, January – February, 2015

Instructor for the Mechanical Engineering Measurements (with Labs).

Gave lectures, advised students on proper experimental techniques and data interpretation.
Directed undergraduate lab experiments. Developed syllabus, schedule, and sakai webpage for the course.

Assistant/Associate Professor, Samarkand State University, Uzbekistan, September 1999 - October 2007

Instructor for the Classical Continuum, Theory of Elasticity, & Wave Propagation Courses.

Classical Continuum Mechanics Course was given over three semesters: 1st semester – Kinematics of deformable medium, 2nd semester: Dynamics of deformable medium, and 3rd semester: Thermodynamics.
Lectured Courses and contributed to the course curriculum development. Prepared lecture notes, exam questions, and study materials (notes, electronic resources) for students; wrote reports & proposals. Supervised research for an M.Sc. thesis, consulted M.Sc. students, advised senior students, led senior research projects & thesis, wrote report & proposals. Initiated the establishment of collaboration agreement between UC Davis and Samarkand State University.

Teaching Assistant, Rutgers University, Piscataway, NJ

Design and Manufacturing Course, August 2013 -June 2014.

Managed Senior Design & Manufacturing Projects, directed student teams to build their designs, ordered parts, graded reports & presentations. Received a Recognition Award for an outstanding leadership.

Dynamics & Material Mechanics Courses, September 2011 – June 2012 and September 2010-June 2011

Taught recitation classes, assisted and substituted course instructors when required.
Directed students in office hours, assigned homework, graded quizzes & exams, accumulated grades.

Grader, Rutgers University, Piscataway, NJ

Mechanical Engineering Computational Analysis and Design, January 2010 - May 2010

Graded student's homework & lab assignments, and MATLAB codes.

<u>High School level</u>

Math and Informatics Teacher, School # 6, Samarkand, Uzbekistan, January 1995 – March 1999

Taught Classes on Informatics, Algebra and Introduction to Analysis, & Geometry (Planimetry & Stereometry) for grades 9-11. Prepared lesson plans, reports, & exam & quiz questions; graded homework, exams, & computer projects**.**

Math Teacher Trainee, School # 2, Samarkand, Uzbekistan, October 1994 – December 1994

Pedagogical Practical Training:

Developed teaching skills to teach Math in Middle & High School Classes, taught Math classes for 4-11 grades. Prepared daily & monthly lesson plans, analyzed classes taught by experienced teachers & trainees.

MENTORING EXPERIENCE

Assistant Professor, San Jose State University, San Jose, CA, August 15 2018- Present

Directing/directed four undergraduate, and three graduate engineering students on designing metamaterial structures and sound diffusers using optimization methods and deep learning. Four of the students are women, two first generation students, one minority student

Assistant Professor, Western New England University, Springfield, MA, January 2016 – May 2018

Mentoring a group of six undergraduate engineering students for "Acoustic Particle Separation Research and Development for FloDesign Inc." project under a contract from Rolls Royce North America; directing the students to conduct experiments to study the feasibility of Acoustic Particle Separation technique using acoustic standing waves in chamber and perform numerical simulations on COMSOL and Matlab for this project. Guided three undergraduate research work. Directed four senior design projects in Spring 2017:

1. Redesign and build a Quick Disconnect (QD) device used for Aerospace applications – Part 1: Internal Design
   Student: Joseph DaSilva.
   Sponsor: Titeflex Commercial, Inc.
   Participated at ASME Old Guard technical poster competition, E-Fest North America East, Tennessee Tech University, April 21-23rd, 2017. (First Place ASME Old Guard Technical Poster Presentation).
2. Redesign and build a Quick Disconnect (QD) device used for Aerospace applications – Part 2: External Design
   Student: Nicholas Mortimer.
   Sponsor: Titeflex Commercial, Inc.
3. Design and Build a High Frequency Horn. Student: Cameron Guerette, Sponsor: WNEU.
4. Design, build and study properties of Metamaterial Structure. Student: Kyle Fitzgerald, Sponsor: WNEU.

Currently directing four senior design project:

1. Design and Fabrication of an Acoustic Metamaterial Lens (one year-long senior design project)
   Student: Samuel Catton, Sponsor: WNEU.
2. Design Optimization of a 3lb Combat Robot
   Student: Trevor Coulter, Sponsor: WNEU
3. Design and Build of a Windwalker
   Student: Jacob Gaboury, Sponsor: WNEU
4. Study the Tool Life of Ultrasonic Machine Tools
   Student: William Smith, Sponsor: WNEU

Applied Mechanics Program, Faculty of Mechanics and Mathematics, Samarkand State University

Supervised a woman graduate student, Zebo Qodirova, directed MSc thesis research: Deformation of cylindrical structures under external loading, 2006-2007.

Led senior research projects & thesis for senior students, 1999-2007

Postdoctoral Fellow, Vassar College, Physics+Astronomy Department, Poughkeepsie, NY August 2015-January 2016

Mentored students at Vassar Acoustics Research Lab throughout academic year including research at URSI (Undergraduate Research Summer Institute) – 2015 program at Vassar College. Prepared students to participate at URSI Symposium.

UNIVERSITY SERVICES

Graduate Studies Committee Member, San Jose State University, San Jose, CA August **2018** – Present

Serving at the Graduate Studies Committee of Mechanical Engineering Department at San Jose State University

Research Committee Member, San Jose State University, San Jose, CA August **2018** – Present

Serving at the Research Committee of College of Engineering at San Jose State University as a faculty representative of Mechanical Engineering Department.

Faculty Council Online Committee Member, Western New England University, Springfield, MA, September **2017** – May 2018

Served at the Faculty Council Online Committee of Western New England University as a faculty representative of College of Engineering.

Technology Committee Member, Western New England University, Springfield, MA, September **2017** – May 2018

Served at the Technology Committee of Western New England University as a faculty representative of College of Engineering.

Faculty advisor, Western New England University, Springfield, MA, September **2016** – May 2018

Advised 26 sophomore/junior undergraduate students, helping them to register for classes, and to find internships

SWE Faculty advisor, Western New England University, Springfield, MA, September **2016** – May 2018

Advised Society of Women Engineers Western New England University Chapter members; Led SWE activities at the Western New England University to foster the professional growth of women within the academy and engineering; developed outreach programs that inspire and support girls to study and pursue career in STEM fields. Organized with our SWE members outreach activities for schoolchildren at Wilbraham Middle School (once a week in April 2017). Participated at SWE Region F Conference (hosted by UConn SWE on February 24-26, 2017) with

our 8 students - SWE members to share and learn new success stories and discussions promoting the success and future of SWE women.

Honors Committee member, Western New England University, Springfield, MA, September **2016** – May 2018
Serving at the Honors Committee of College of Engineering of WNEU, representing the Mechanical Engineering (ME) Department, and supervising Honors-By-Contract courses offered by ME Department. Editing and helping to prepare documents for ABET assessment & evaluation.

"Healthy Generation" ("Sog'lom Avlod uchun"), Samarkand State University, **2001-2003**
Head of Foundation "Healthy Generation" of the Department of Mechanics & Mathematics.
Maintained activity of "Healthy Generation" at our Faculty. Organized sport & cultural activities, held meetings for students with different professionals to promote healthy lifestyle & raise their medical knowledge of life-threatening diseases, involved in community outreach development, directed students' volunteering at our community helping veterans & elderly lonely people.

SELECTED PUBLICATIONS

Publications in Refereed Journals:

- Amirkulova F., Norris N. Acoustic Multiple Scattering Gradient of Total Scattering Cross Section and Its Application to Cloaking. J. Theoretical & Comp. Acoustics. Accepted: September 2019.
- Amirkulova F., Norris N. Acoustic scattering by a Willis-coupled fluid cylinder. J.Acoust. Soc. Am. 2018, 144 (3), 1832-1832
- Amirkulova F., Caton S.T., Schrader M., Gobel T.J., Norris A. Acoustic gradient index lens design using gradient based optimization. J. Acoust. Soc. Am. 2018, 143 (3), 1948-1948
- Amirkulova F., Norris N. Acoustic Cloak by Inverse Design and Gradient Based Optimization. J. Acoust. Soc. Am. 2017, 142 (4), 2578-2578
- Amirkulova F. Fast iterative solution of acoustic multiple scattering problems. J. Acoust. Soc. Am. 2017, 141(5), 4035.
- Amirkulova F., Norris A. Negative refraction of acoustic waves in phononic crystals using recursive algorithms for block Toeplitz matrices. J. Acoust. Soc. Am. 2015, 138 (3).
- Amirkulova F.A., Norris A.N. Acoustic multiple scattering using recursive algorithms, J. Comput. Phys. 2015, http://dx.doi.org/10.1016/j.jcp.2015.07.031
- Norris A., Amirkulova F., Parnell W. Active elastodynamic cloaking. Math. Mech. Solids. 2014. 19(6), p. 603-625, doi:10.1177/1081286513479962
- Titovich A., Amirkulova F. Tuned elastic shells with matched acoustic impedance and sound speed in water. J. Acoust. Society of America. 2013, 134(5), p. 4067, http://dx.doi.org/10.1121/1.4830846
- Norris A., Nagy A., Amirkulova F. Stable methods to solve the impedance matrix for radially inhomogeneous cylindrically anisotropic structures. J. Sound & Vib. 2013, 332(10), p. 2520–2531
- Norris A., Amirkulova F., Parnell W. Source amplitudes for active exterior cloaking. Inverse Problems. 2012, 28(10), 105002. doi:10.1088/0266-5611/28/10/105002
- Amirkulova F. Torsional waves in viscoelastic cylindrical layer with initial. J. Problems in Mechanics. Tashkent, 2005, V. 6, p. 6-11. (*In Russian*)
- Amirkulova F.A. Numerical-analytical analysis of thermo-stressed state of viscoelastic cylindrical shell. J. Problems in Mechanics, Tashkent, 2003, Vol.2, p. 24-28. (*In Russian*)
- Amirkulova F.A., Burkutboev Sh.. Equation of axisymmetric vibration of circular cylindrical shell with flowing viscous compressible fluid. J. Problems in Mechanics. 2003, Vol.2, p.34-37. (*In Russian*)
- Kh. Khudoynazarov, Amirkulova F.A.. Mathematical theory of axisymmetrical vibrations of cylindrical layer with variable thickness. J. Problems in Mechanics, 2003, Vol.1, p. 19-23. (*In Russian*)
- Amirkulova F.A., Holmurodov R.I. Thermo-stressed state of cylindrical shells with non-stationary hea-ting at the boundary.Vestnik RUDN, Spec. issue: Geometry&design, Moscow, 2002, Vol.1, p.62-65
- Khudoynazarov Kh,, Amirkulova F.A. Longitudinal-radial vibrations of circular cylindrical thermo-viscoelastic shells. Vestnik RUDN, Spec. issue: Geometry&design, Moscow, 2002, Vol.1, p.66-70.
- Amirkulova F.A., Javliev B.K. The torsional vibrations of pre-stressed viscoelastic transversal-isotropic circular cylindrical layer. J. Problems in Mechanics, 2002, Vol.6, p. 18-22. (*In Russian*)

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- Amirkulova F.A. The refined equation of longitudinal-radial vibrations of pre-stressed viscoelastic cylindrical layer. J. Problems in Mechanics, 2002, Vol.6, p.27-32. (*In Russian*)
- Amirkulova F.A. Non-stationary axisymmetric vibration of transversal-isotropic circular cylindrical layer with initial stress. Reports of Academy Sciences of Uzbekistan, 2002, Vol.5, p.16-21. (*In Russian*)
- Amirkulova F.A. Torsional vibrations of viscoelastic cylindrical layer with variable thickness. Problems of Architecture & Civil Eng., Samarkand, 2002, Vol.4, p. 23-27. (*In Russian*)
- Amirkulova F.A.. Axisymmetrical vibrations on half-endless thermoelastic cylindrical column. Messenger of scientific researches, Samarkand, 2002, Vol.3, p. 32-38. (*In Russian*)
- Amirkulova F.A., Khudoynazarov Kh., Rabbimov A.S. The effect of non-stationary cylindrical wave on the viscoelastic cylindrical layer situated in noncompressible fluid. J.Problems in Mech., 2000, V.4, p.80-87
- Khudoynazarov Kh., Amirkulova F.A. Non-stationary interaction of circular layer with deformed medium. Messenger of scientific researches, 2000, Vol.3, pp. 22-34. (*In Russian*)
- Amirkulova F.A. Vibrations of half-endless cylindrical layers with the ideally supported face. J. Problems in Mechanics, 1999, V.4, pp.72-77. (*In Russian*)
- Amirkulova F.A., Khudoynazarov Kh. Fluctuations of half-endless cylindrical layer with dynamic excitement at the end face. Reports of Academy Sciences of Uzbekistan, 1998, Vol.5, pp.16-21 (*Russian*)

Publications in the Conference Proceedings:

- Amirkulova F., Norris N. Broadband Acoustic Cloak Design using Gradient-based Optimization. Phononics 2019: 5th Int. Conf. on Phononic Crystals/Metamaterials, Phonon Transport, Topological Phononics, June 2019, Tucson, Arizona**,** paper number: PHONONICS2019-0118, pp. 227-228.
- Amirkulova F., Norris N. Design of acoustic metamaterials using gradient based optimization. IMECE2018, ASME, 2018, paper number: IMECE2018-88254
- Amirkulova F., Norris N. Acoustic multiple scattering using fast iterative techniques. IMECE2017, ASME, 2017, paper number: IMECE2017-72249
- Amirkulova F.A. The influence of pre-stress on axisymmetrical vibrations of cylindrical layer. Proceed. Int. Conf. Comp. Solid Mechanics, Moscow, 2006, p. 425-428.
- Amirkulova F.A. Vibrations of semi-infinite thermosviscoelastic cylindrical layer with restrained face. Proceedings of Int. Conf. Modern problems of Math. Phys. & IT, 2005, Tashkent, p. 116-120
- Amirkulova F.A. Torsional waves in an initially stressed thick cylindrical shell with nonzero initial conditions. Proceedings of 8th Int. Conf. Shell Structures: theory & appl. Balkema, 2005, p.285-289
- Amirkulova F.A. Stress-strain state analysis of cylindrical layer with initial displacement. Proceed. Int. Conf. Problems of Mech. & Seismic Dynamics of Structures. Tashkent, 2004, p.23-26.
- Amirkulova F.A. Refined vibrations equations of anisotropic pre-stressed cylindrical layer", Abstracts of the Int. Conf. Differential equations, Almaty, 24-26 September, 2003, p.76-77.
- Amirkulova F.A. Numerical-analytical analysis of thermo-stressed state of viscoelastic cylindrical shell. Compil. Of Abstracts 2ndMIT. Conf. Comp. Fluid & Solid Mech., Cambridge, 2003, p.1.
- Amirkulova F.A. Non-stationary longitudinal-radial vibrations of circular thermo-elastic shells. Proceed. 7th Int. Conf. Shell Structures: Theory & Appl., Gdansk-Jurata, Poland, 2002, p.45-46.
- Khudoynazarov Kh., Amirkulova F.A. Application of combined attachments of the shafts of small mines. Abstracts of the Int. Conf. "Innovation-2001", Tashkent, October 2001, p. 213-214.
- Amirkulova F.A., Khudoynazarov Kh. Boundary conditions on the end face of circular cylindrical layers under longitudinal vibrations. Conf. Modern Problems of Mechanics, Tashkent, 2001, p.333-338
- F.A. Amirkulova, Kh. Khudoynazarov, A. Rabbimov. The effect of non-stationary cylindrical wave on the viscoelastic layer in the acoustic medium. Proceed. Of the First Central Asian Geotechnical Symposium, 2000, Astana, pp. 660-662
- Amirkulova F.A. Vibrations of half-endless cylindrical layers under kinematic excitation at the end face. Progressive Technol., Develop. Methods, & Appl. Techniques in Aerospace, Tashkent, 1998, p.85-86.
- Filippov I.G., Amirkulova F.A. Vibrations of half-endless cylindrical layers with the pinch face. Proceed. Int. Conf. Actual Problems of Theoretical. & Appl. Mech. Samarkand, 1997, p.11-16.

Books:

- Khudoynazarov Kh., Amirkulova F. Interaction of cylindrical layers and shells with coupled fields. Navruz, Tashkent, 2011, 336 pages. (*In Russian*)

Book Chapters:

- Amirkulova F.A. Mathematical vibration modeling of pre-stressed viscoelastic thick walled cylindrical shell. In *Math.Modeling, Simul., Visualiz.& E-Learning.* Edited by Dialla Konaté. Springer, 2008, p.271-289.
  Amirkulova F.A. Non-stationary vibrations of viscoelastic circular cylindrical thick shell under the influence of temperature. In *Math. Modeling, Simul., Visualiz. & E-Learning*. Edited by Dialla Konaté. Springer, 2008, p. 290-314.

SELECTED PRESENTATIONS

- Amirkulova F., Norris N. "Design of acoustic metamaterials using gradient based optimization." ASME's IMECE2018, Pittsburgh PA, November 12, 2018
- Amirkulova F., Norris N. "Acoustic scattering by a Willis-coupled fluid cylinder", the 176th Meeting of the Acoustical Society of America in Victoria, British Columbia, November 7, 2018
- Amirkulova F. "Design and optimization of acoustic metamaterial based on gradient method", SPIE Optics+Photonics Conference, San Diego, CA, August 24, 2018
- Amirkulova F., Caton S.T., Schrader M., Gobel T.J., Norris A. "Acoustic gradient index lens design using gradient based optimization", the 175th Meeting of the Acoustical Society of America in Minneapolis Minnesota, May 10, 2018.
- Amirkulova F. Norris A. "Acoustic Cloak by Inverse Design and Gradient Based Optimization", the 174th Meeting of the Acoustical Society of America in New Orleans, Louisiana, December 5, 2017
- Amirkulova F., Norris A. "Acoustic multiple scattering using fast iterative techniques". ASME's IMECE2017, Tampa, FL., November 8 2017.
- Amirkulova F. "Fast iterative solution of acoustic multiple scattering problems". 173rd Meeting of the Acoustical Society of America and the 8th Forum Acusticum, Boston, MA, June 24-29 2017.
- "Multiple Scattering Effects Using Recursive and Iterative Techniques", the 13th Annual Conference on Frontiers in Applied and Computational Mathematics, NJIT, Newark, NJ, May 2016.
- "Acoustic multiple scattering using recursive and iterative techniques", Mechanical & Industrial Engineering colloquium seminars at NJIT, Newark, NJ, November 2015.
- "Negative refraction of acoustic waves in phononic crystals using recursive algorithms for block Toeplitz matrices", 170 Meeting of Acoustical Society of America, Jacksonville, FL, November 2015.
- "Numerical prediction of sound scattering from fractal surfaces", URSI Symposium, Vassar College, September 2015.
- "Active cloak modeling", Computations in Physics, American Physical Society NYSS 113th Topical Symposium, Vassar College, NY, September, 2015.
- "Active acoustic and elastodynamic cloaking", Acoustic MURI Summer Kickoff: Expanding the Limits of Acoustic Metamaterials, Duke University, Durham, NC, 2013.
- "Non-stationary vibrations of viscoelastic circular cylindrical thick shell under the influence temperature" and "Mathematical vibration modeling of the pre-stressed viscoelastic thick walled cylindrical shell", Int. Workshop on Math. Modeling, Simulation, & E-Learning, Bellagio, Italy, 2006.
- "Torsional waves in initially stressed thick cylindrical shell with non-zero initial conditions", the 8th Int. Conference on Shell Structures: theory and applications, Gdansk - Jurata, Poland, 2005
- "Numerical-analytical analysis of thermo-stressed state of a viscoelastic cylindrical shell", the 2nd M.I.T. Conference on Computational Fluid and Solid Mechanics, Cambridge, MA, USA, 2003.

SKILLS

Computer skills: MATLAB, Python, TensorFlow, Keras, PyTorch, FORTRAN, COMSOL, ANSYS, MAPLE, Julia, BEM++, AcouSTO, SolidWorks, Linux, OpenMP, OpenMPI, XSEDE, FEniCS, OriginPro, LATEX, Microsoft Office, BK connect
Leadership skills: Experience in project team leadership; led student's thesis, research and design projects
Languages: Fluent in English, Russian, Tajik, and Uzbek

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AREAS OF INTEREST

Mathematical & Numerical Modeling, Computational Solid Mechanics and Acoustics, High Performance Computing, Machine Learning, Constrained Nonlinear Optimization, Artificial Neural Networks, unsupervised and supervised deep learning, GAN, VAE, Mechanical Design, Structural Mechanics, T-matrix method, Multiple Scattering, Bi-anisotropy, Willis materials, Invisibility Cloak, Phononic Crystals, Metamaterials, Composites, Acoustic Scattering & Structural Vibration**,** Wave Propagation, Diffusers, Fractals, Acoustic Levitation, Dynamic Properties of Materials, Dispersion Relations, Anisotropy, Impedance, Acoustic Particle Separation, Numerical Integration, BEM, FEM, Iterative & Recursive Algorithms, Parallel computing, SVD, Neumann expansion, Toeplitz matrices, Block matrices, Eigenvalue Problems, Non-normal matrices, Linear Algebra

RESEARCH GRANTS

Current Projects:

- Co-PI: Amirkulova F. A., PI: Keles O. and 3 Co-PIs and 2 collaborators from Rutgers University and UC Merced. "Acquisition of a metal additive manufacturing system for multi-disciplinary research and education at a minority-serving institution" 2019-2020, NSF-MRI grant award, $326,960.
  - directing two undergraduate and three graduate students for this project to build and test metamaterial structures using neural nets and additive manufacturing system.

Pending Projects:

- PI: Amirkulova F. A. "Machine Learning for Acoustic Metamaterial Design" submitted to AWS Machine Learning Research Awards, August 2019, $100,000.

Completed projects:

- PI: Amirkulova F. A., Faculty Summer Support Research Grant, San Jose State University, $10,000, June-August 2019
  - directed one undergraduate and three graduate students, and a high school student over summer; the results will be presented in three oral presentations at ASA meeting in San Diego, December 3 2019
- PI: Amirkulova F. A. "Acoustic Particle Separation Research and Development for FloDesign Inc" project under a contract from Rolls Royce North America, $50,000.00, September 2016 – September 2017
  - directed and supervised 6 undergraduate sophomore and junior engineering students for this project; performed numerical simulations in COMSOL and Matlab, and conducted experiments to study the feasibility of Acoustic Angled Wave Particle Separation Technique for a dust removal from engine inlet.
- PI: Amirkulova F. A. "Design of acoustic cloaking devices and metamaterials using fast iterative techniques", Faculty Summer Research Grant, Western New England University, $4,000.00, June 2017 – August 2017
  - directed one undergraduate junior engineering student for this project; performed numerical simulations in Matlab and Julia for modeling acoustic scattering problems.

Denied Projects:

- PI: Amirkulova F. A., 4 Co-PIs, 8 Senior Personnel from Western New England University, and collaborators from Rutgers University and California State University Fresno: "Acquisition of a high performance cluster for instruction and applied research in STEM fields", 2018, $ 192,062.50, submitted to NSF-MRI program.
- PI: Amirkulova F. A., 4 Co-PIs, 7 Senior Personnel from Western New England University, and a collaborator from Rutgers University. "Acquisition of a computer cluster for multiple colleges within Western New England University", 2017, $184,774.00, submitted to NSF-MRI program, declined October 2017.
- PI: Amirkulova F. A., 6 Co-PIs from Western New England University. "The Science, Pharmacy, and Engineering Computational and Translational Research Alliance (SPECTRA)", 2017, $200,000.00, submitted to The Silicon Mechanics Research Cluster Grant program, rejected April 2017.
- PI: Amirkulova F. A., 16 Co-PIs including 8 Co-PIs from Engineering College. "An HPC cluster to manage massive and compute-intensive workloads in Engineering, Theoretical and Applied Sciences, and Biomedical Technology at Western New England University", Silicon Mechanics Research Cluster Grant, $200,000.00, submitted in March 1 2016, rejected April 2016.

FERUZA A. AMIRKULOVA

AWARDS AND GRANTS

- NSF Fellowship Award/Travel Stipend to attend Phononics Conference, University of Arizona, AZ, 2019
- UGA- University Grants Academy award, 0.2 Course release (~$11,250), San Jose State University, 2019
- Diversity Travel Grant to attend the JuliaCon2017 conference at UC Berkeley, 2017
- Recognition Award for outstanding leadership & supporting Senior Design Projects, Rutgers, 2014
- Individual travel grant to participate at workshop, Rockefeller Foundation, USA-Italy, November 2006
- Individual travel grant, "Este'dod" Foundation of Republic of Uzbekistan, September 2006
- Individual mobility grant, European Commission, January 2005
- International travel grant to attend 2nd MIT Conf. Comp. Fluid & Solid Mech., US CRDF, 2003
- Visiting scholar grant to visit UC Davis, Center of Science & Technology of Uzbekistan, January 2003

MEMBERSHIPS

- Acoustical Society of America: Active member since 2015
- American Society of Mechanical Engineers: Active member since 2017
- American Association University Women: Active member since 2018
- Society of Women Engineers: Active member since 2017
- SPIE (Society for optics and photonics technology): August 2018-2019
- Society of Exploration Geophysics: October 2014 – December 2015

SINERGETIC ACTIVITIES

- Organizing a new Special Session "Design of acoustic metamaterials using optimization and machine learning" at the 178 meeting of the Acoustical Society of America that will be held in San Diego, CA, December 2-6, 2019 (Chairs: myself).
- Member of organizing committee of "The 2019 Women in Engineering (WiE) Conference Design Your Future", held at San Jose State University, Co-Chair of "Machine Learning Applications" Session, San Jose CA, March 16 2019
- Member of "Noise Control Acoustics Division" Technical Committee and new Technical Committee on "Design of Engineering Materials" at the American Society of Mechanical Engineers.
- Member of Committee on Women in Acoustics and Physical Acoustics Technical Committee Member at Acoustical Society of America
- Organized a new Special Session "Willis coupling in acoustic metamaterials" at the 176 meeting of the Acoustical Society of America that was held in Victoria, BC, Canada, November 5-9 2018 (Co-Chairs: myself and Dr. Haberman M., UT Austin).
- Serving at American Association of University Women Fellowship selection review panel, 2017-2020.
- Served at CMMI NSF review panel, 2016, 2019.
- Referee of 6 journals: Journal of Acoustical Society of America; Acustica; Journal of Sound and Vibration; Wave Motion; Mechanics Research Communications; Computers & Mathematics with Applications.
- Developed outreach programs with local middle schools and high school that inspire and support girls and under-represented ethnic minorities to study and pursue career in STEM fields. Collaborated with MGHPCC on outreach programs for Holyoke K12 schoolchildren (minorities) and with Wilbraham middle and elementary schools to make schoolchildren interested in high performance computing, science and engineering.
- Broadened participation of underrepresented groups in STEM: Advising Society of Women Engineers Western New England University Chapter members; Leading SWE activities at the WNEU to foster the professional growth of women within the academy and engineering.
- Organized with our SWE members outreach activities for schoolchildren at Wilbraham Middle School (once every week in April 2017), and an outreach event for Girl Scouts of Somers, CT (November 3rd 2017) at the Scout Lodge on Battle St in Somers, CT; the activities involved the table building challenge, lego challenge, paper circuits, spaghetti tower challenge, robot jousting, life 3d printing demonstrations, etc. Organized "Engineering Day" at Wilbraham Elementary School with our Engineering Faculty and Staff (June 16 2017).

- Mentored a group of six (one woman) undergraduate (sophomore/junior) engineering students for "Acoustic Particle Separation Research and Development for FloDesign Inc." project under a contract from Rolls Royce North America; directed the students to conduct experiments to study the feasibility of Acoustic Particle Separation technique using acoustic standing waves and perform numerical simulations on COMSOL and Matlab for this project. Guided undergraduate (junior) research works. Directed four senior design projects.
- Participated in the project for "The Academy at Rutgers for girls in Engineering & Technology" sponsored by Motorola at the Intrepid Museum (2011) introducing the school-girls to engineering world, and inspiring the next generation of woman engineers & scientists to innovation.
- Supervised a female graduate student, directed MSc thesis research: Deformation of cylindrical structures under external loading, 2006-2007; Led senior research projects & thesis for 4-5 senior students every year during my appointments at Samarkand State University.
- Contributed to the course curriculum development for Classical Continuum Mechanics Course given at Samarkand State University over three semesters: 1st semester – Kinematics of deformable medium, 2nd semester: Dynamics of deformable medium, and 3rd semester: Thermodynamics (2001-2002).
- Attended COMSOL short course on Acoustics and Structural Vibrations, Burlington, MA, July 27 2017.
- Attended NSF Day Workshop at the University of Saint Joseph, CT, September 12, 2017.
- Attended a Course "Designing Your Online Course" by Quality Matters, MA, September 29, 2017.
- Attended The **AI & Big Data Expo North America 2018,** Santa Clara, CA, November 2018
- Attended The **ScaledML** 2019 Conference, Mountain View, CA, March 27-28 2019
- Registered to attend The **Machine Learning in Science and Engineering (MLSE)** at Georgia Tech, Atlanta, GA, June 9-12, 2019
- Registered to attend and present at APCOM 2019 to be held in Taipei, Taiwan, December 2019, www.apcom2019.org
- Registered to attend the SWE Annual WE Conference 2019, https://we19.swe.org/
- Registered to attend and present at the 178th ASA meeting to be held in December 2-6 2019, San Diego CA, https://acousticalsociety.org/asa-meetings/