

CURRICULUM VITAE

PIOTR KIELCZYNSKI



EDUCATION

- 1974 M.Sc. in Electronics
Warsaw University of Technology (PW), Warsaw, Poland
Specialization: Radio-electronics, Microwave Theory and Technique
- 1979 PhD in Applied Sciences
Polish Academy of Sciences, Warsaw, Poland
Institute of Fundamental Technological Research
Specialization: Surface Acoustic Waves, General Acoustics.
- 1975-1989 Post diploma courses in Applied Mathematics , Differential Equations
Functional Analysis, Numerical Methods FEM, BEM at Warsaw University
- 2000 Habilitation (Associate Professor) in Polish Academy of Sciences

SPECIALIZATION

- applied mathematics
- **ultrasonic waves, mechanical fields**
- **general physical acoustics**
- **sensors, chemosensors, biosensors**
- **piezoelectricity, piezoelectric ceramics**, electromagnetism
- wave motion, **elastic bulk waves, ultrasonic Love waves**
- **surface acoustic waves in piezoelectric and elastic media**
- materials characterization, **rheology**, polymers, thin films
- **functionally graded materials**
- digital signal processing, computerized instrumentation
- transducer design, **piezoelectric resonators**
- acoustic waves in liquids and solids at **high pressure**
- **high-pressure** phase transitions in liquids (e.g., in biofuels)
- **high-pressure** thermophysical properties of liquids (e.g., oils and biofuels)

REALIZATIONS

- design and construction of new airborne transducers for intelligent robots
- development **FEM and BEM programs** to analyze acoustic waves in curved and planar structures
- numerical modelling of heat transfer in power transducers and power transistors
- modelling of acoustic fields generated by the non-uniform ultrasonic transducers
- **modelling of surface acoustic waves in piezoelectric, elastic and viscoelastic media**
- **modelling of compound piezoceramic resonators, cylindrical piezoceramic viscosity sensors**
- computerized virtual instrumentation
- **ultrasonic Bleustein-Gulyaev (B-G) and Love wave viscosity sensors**
- **inverse method to evaluate elastic parameters of Functionally Graded Materials (Love waves)**
- **evaluation of high-pressure physicochemical parameters of liquids by using ultrasonic waves**
- **inverse method to evaluate simultaneously the density and viscosity of liquids by using Love waves**

PROJECTS

I. NATO Collaborative Research Grant #HTECH.LG. 930433, 1994 – 1997, Co-Investigator

II. Projects granted by **NATIONAL RESEARCH CENTRE (Poland)**

- 1) “Scanning Contact Acoustic Microscope”, 1993-1996, **Principal Investigator (PI)**
- 2) “Surface Acoustic Wave Viscosity Sensors”, 1998 – 2001, **Principal Investigator (PI)**
- 3) “Ultrasonic-Indentation Method for Evaluations Elastic and Plastic Parameters of Metals, Ceramics, Semiconductors and Plastics”, 2007 – 2011, **Principal Investigator (PI)**
- 4) "Identification of changes in elastic profiles in graded materials using ultrasonic Love waves", 2011-2014, **Principal Investigator (PI)**
- 5) “Identification of rheological parameters of viscoelastic media on the example of liquid and solid polymers by ultrasonic surface Love waves”, 2017- till present, **Principal Investigator (PI)**

EMPLOYMENT HISTORY

1975-1979	Polish Academy of Sciences Institute of Fundamental Technological Research Theory and practice of bulk and surface acoustic waves propagation
1979-1986	Institute of Electron Technology in Warsaw Modeling of electron devices and VLSI
1986-present	Polish Academy of Sciences Institute of Fundamental Technological Research in Warsaw Head of the Acoustoelectronics Division from 2004-till present

PUBLICATIONS: more than 90 scientific papers in internationally recognized prestigious journals
(Times cited: 434 - ISI WEB of Knowledge, Hirsh index: H=13)

INTERNATIONAL ACTIVITY (RESEARCH STAYS)

- 1) Denmark, Copenhagen, DTH, 1990, 6 month, visiting scholar
- 2) Canada, Concordia University, Montreal, 1995, 3 month, visiting scholar
- 3) Japan, JSPS – Tokyo Institute of Technology. 1999, 10 month, visiting professor
- 4) Japan, Tokyo Institute of Technology, 2002, 2004, 1 month, visiting professor
- 5) Japan, Shizuoka University, Hamamatsu, 2010, 1 month, visiting professor

MUTUAL CO-OPERATION

1. Prof. Fink – Paris VII – ESPCI – 1992
2. Dr Bonnelo – Pierre et Marie Curie Universite Paris VI -1994-1997
3. Prof. Vetelino, University of Maine, USA – 1996
4. Prof. Iwamoto, Tokyo Institute of Technology - 1999
5. Prof. Gallego-Juarez, Instituto de Acustica, Madrid, Spain – 2002
6. Dr Arnau – Universidad Politecnica de Valencia – 2002
7. Dr Kondoh – Shizuoka University, Hamamatsu, Japan 2007-till present

INTERNATIONAL CONFERENCES

1. 12th TOIN International Symposium on Biomedical Engineering, 11 November 2017, **TOIN University of Yokohama, Japan**
2. **IEEE Ultrasonic, Ferroelectrics and Frequency Control Symposium**, USA: 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017

3. ECCOMAS Int. Symp. **Inverse Problems in Mechanics**, 2009 April 23-25, 2009, Łańcut, Poland
4. Ultrasonic Imaging, Bochum, Germany, 1990.
5. IV Workshop on Acoustic Wave Sensors in Salbris, France, 2003
6. 345 WE-Heraeus Seminar: Acoustic Wave Based Sensors: Concepts, 2005, Bad Honnef, Germany.

PLENARY LECTURER (INVITED SPEAKER)

1. 12th TOIN International Symposium on Biomedical Engineering, 11 November 2017, **TOIN University of Yokohama**, Japan
2. 25th Jubilee International Scientific Conference, Progress in Technology of Vegetable Fat, 31 May-2 June 2017, Rynia, Poland

MEMBERSHIP

IEEE (Institute of Electrical and Electronic Engineers) – USA, member from 2002.
Senior Member from 2012

REFEREE IN SCIENTIFIC JOURNALS

1. Journal of Applied Physics
2. IEEE Trans. on UFFC (Ultrasonics, Ferroelectrics and Frequency Control)
3. Ultrasonics
4. International Journal of Solids and Structures
5. Geophysical Journal International
6. Sensors
7. Philosophical Magazine

MY MAJOR SCIENTIFIC ACHIEVEMENTS ARE AS FOLLOWS:

- 1) Theory of surface acoustic **Love waves** in non-homogeneous elastic media –1981
- 2) **Inverse method** for determining the elastic properties in non-homogeneous elastic media using **shear surface acoustic waves** – 1985
- 3) Theory of inhomogeneous **planar optical waveguides** – 1987
- 4) Theory of non-diffracting ultrasonic **Bessel beams** –1993
- 5) Theory of **piezoelectric cylindrical resonators + viscoelastic liquid**. I have established a **formula** for an **electrical admittance** of the resonator – 2002
- 6) Theory of **compound piezoelectric cylindrical resonators (electrical admittance, equivalent circuit, eigenfunctions + eigenvalues, impedance Z matrix)** –2003 – 2007
- 7) Development of a new method for measuring the viscosity of liquid crystals using **Bleustein-Gulyeav (B-G) electro-acoustic surface waves** – 2004
- 8) Development of a **new method** to measure the **viscosity** of liquids under **high pressure** (up to 800 MPa) – 2007
- 9) Establishment of a new **inverse method** for the determination of **elastic** parameters of functionally graded materials using elastic surface waves – 2011, 2016
- 10) Development of a new **inverse method** for evaluation of **rheological** parameters of liquids by means of ultrasonic waves, 2014
- 11) Solution of the **Direct Sturm-Liouville Problem** for Love waves propagating in viscoelastic waveguides, 2017
- 12) Discovery of **high-pressure phase transitions** in biofuels (methyl esters) by ultrasonic methods (cold-start problem), 2017

INTERNATIONAL RECOGNITION AND DIFFUSION

- 1) I was invited as a Plenary Lecturer at the 12th TOIN International Symposium on Biomedical Engineering, 11 November 2017, **TOIN University of Yokohama, Japan**
- 2) My scientific **achievements were selected for presentation during** “Polish Science and Technology Forum” in **Paris**, 15-16 September 2003.
- 3) I spent over 9 month at **Tokyo Institute of Technology (Department of Physical Electronics)** in 1999 as a visiting professor. During this stay I developed a new theory of the **electro-mechanical** behavior of **Langmuir-Blodgett monolayers (liquid crystals)**.
- 4) I spent 6 months at **Danish Technical University** in Lyngby, Copenhagen in 1990 as a visiting scholar developing theory of diffraction-less ultrasonic beams.
- 5) I spent 3 months at **Concordia University in Montreal**, Canada in 1995 as a visiting scholar establishing a new theory of **ultrasonic surface waves in loss media**.

I am internationally recognized expert in the domain of Ultrasonics.

EFFORTS AND ABILITY TO INSPIRE YOUNGER RESEARCHERS

1. I was a reviewer of the PhD dissertation. S. Rubalya Valantina, "Computation of viscosity and study of antioxidant stability in edible oils using neural network". Department of Physics, Sastra University, India, 2012.
2. I was a reviewer of the habilitation (D.Sc.) dissertation conducted in the Geological Institute of the Polish Academy of Sciences in Warsaw – 2005
3. I was a supervisor of two MSc dissertations conducted in the Warsaw University of Technology, Faculty of Physics – 2008

The domain of my research includes many overlapping areas such as: **Acoustics, Ultrasonics, Electrodynamics, Continuum Mechanics, Optics, Applied Mathematics, Electronics etc.**

CHAPTERS IN MONOGRAPHS:

- 1) P. Kielczyński, “Application of **acoustic waves** to investigate the physical properties of liquids at high pressure”, in “Acoustic Waves”, ed. by D.W. Dissanayake, Sciyo, Rijeka, Croatia, 2010, Chapter 14, 317-340.
- 2) P. Kielczyński, “The Application of **Ultrasonics** for Oil Characterization”, Chapter 5, in “Ultrasound in Food Processing: Recent Advances”, Mar Villamiel (Editor), Jose V. Garcia-Perez (Editor), Antonia Montilla (Editor), Juan A. Carcel (Editor), Jose Benedito (Editor) (2017), **John Wiley & Sons** (2017), pp. 115-145, ISBN: 978-1-118-96418-7
- 3) P. Kielczyński, Power Amplification and Frequency Selectivity in the Inner Ear: **A New Physical Model**, Chapter 5, in Advances in Clinical Audiology, Edited by Stavros Hatzopoulos, IntechOpen (2017) pp. 59-98, [http:// dx.doi.org/10.5772/66542](http://dx.doi.org/10.5772/66542)
- 4) P. Kielczyński, “Properties and Applications of **Love Surface Waves** in Seismology and Biosensors”, in “Surface Waves - New Trends and Developments”, Edited by Farzad Ebrahimi, IntechOpen, (2018), in press.

LIST OF MAIN RECENT PUBLICATIONS IN SCIENTIFIC JOURNALS:

- 1) Kielczyński P., Surface Love waves in a lossy layered planar waveguide with a viscoelastic guiding layer, **Applied Mathematical Modelling**, 53 (2018) 419–432.
- 2) Kielczyński P., Szalewski M., Balcerzak A., Wieja K., Rostocki A.J., Ptasznik S., Evaluation of High-Pressure Thermophysical Parameters of the Diacylglycerol (DAG) Oil Using Ultrasonic Waves, **Food and Bioprocess Technology**, 10 (2017) 358–369.
- 3) P. Kielczyński, S. Ptasznik, M. Szalewski, A. Balcerzak, K. Wieja, A.J. Rostocki, Thermophysical properties of rapeseed methyl esters (RME) at high pressures and various temperatures evaluated by ultrasonic methods, **Biomass and Bioenergy**, 107 (2017) 113-121.
- 4) P. Kielczyński, M. Szalewski, A. Balcerzak, K. Wieja, “Propagation of ultrasonic Love waves in nonhomogeneous elastic functionally graded materials”, **Ultrasonics**, 65, (2016), 220-227.
- 5) P. Kielczyński, M. Szalewski, A. Balcerzak, K. Wieja, A.J. Rostocki, R.M. Siegoczyński, Ultrasonic evaluation of thermodynamic parameters of liquids under high pressure, **IEEE Trans on Ultrasonics, Ferroelectrics, and Frequency Control**, 62 (2015) 1122-1131.
- 6) P. Kielczyński, M. Szalewski, A. Balcerzak, K. Wieja, “Group and Phase Velocity of Love Waves Propagating in Elastic Functionally Graded Materials”, **Archives of Acoustics**, 40, (2015), 273-281.
- 7) P. Kielczyński, M. Szalewski, A. Balcerzak, K. Wieja, A.J. Rostocki, R.M. Siegoczyński, S. Ptasznik, “Application of ultrasonic wave celerity measurement for evaluation of physicochemical properties of olive oil at high pressure and various temperatures”, **LWT - Food Science and Technology**, 57, (2014), 253-259.
- 8) P. Kielczyński, M. Szalewski, A. Balcerzak, “Inverse procedure for simultaneous evaluation of viscosity and density of Newtonian liquids from dispersion curves of Love waves”, **Journal of Applied Physics**, 116, (2014), 044902(7 pages).
- 9) P. Kielczyński, M. Szalewski, A. Balcerzak, K. Wieja, R. Kościeszka, R. Tarakowski, A.J. Rostocki, R.M. Siegoczyński, ”Determination of physicochemical properties of diacylglycerol oil at high pressure by means of ultrasonic methods”, **Ultrasonics**, 54 (2014) 2134-40.
- 10) P. Kielczyński, M. Szalewski, “Transistor Effect in the Cochlear Amplifier”, **Archives of Acoustics**, 39 (2014), 117-124.
- 11) P. Kielczyński, M. Szalewski, A. Balcerzak, A. Malanowski, R.M. Siegoczyński, S. Ptasznik, “Investigation of high-pressure phase transitions in DAG (diacylglycerol) oil using the Bleustein–Gulyaev ultrasonic wave method”, **Food Research International**, 49 (2012) 60-64.
- 12) P. Kielczyński, M. Szalewski, A. Balcerzak, “Effect of a viscous liquid loading on Love wave propagation”, **International Journal of Solids and Structures**, 49 (2012) 2314-2319.