

2012 Symposium on Piezoelectricity, Acoustic Waves, and Device Applications

(SPA WDA 2012)

**Shanghai, China
23-25 November 2012**



IEEE Catalog Number: CFP1225F-PRT
ISBN: 978-1-4673-4814-0

Contents

From the Chair	iii
From the Editors	iv
Committees	v
List of Invited Plenary Talks	ix
Contents	x
Finite difference time domain analysis of two-dimensional piezoelectric phononic crystals	
.....Yi-yu ZHAO, Hong-lang LI , Wei LUO,iang-bo WEI, Yong LIANG, Shi-tang HE	1
The designing and manufacturing of 1MHz piezoelectric micro-machined ultrasonic transducer	
.....Zhi-qun SUO, Zhen-hong HAO, Dong-hai QIAO	5
Influence of Co ₂ O ₃ doped amount on the properties of (Ba _{0.85} Ca _{0.15})(Zr _{0.1} Ti _{0.9})O ₃ lead-free piezoelectric ceramics	
.....Xin-you HUANG, Chun-hua GAO, Zhi-wen ZHU, Li PAN, Zhi-gang CHEN	9
Research on LFM signals in steel materials	
.....Chang-zheng LI, Fang-fang SHI , Bi-xing ZHANG	13
Properties of miniature X- and Z'-elongated rectangular AT-cut quartz resonators of different sizes	
.....S.Y. PAO, Q.Q. PAN, J.S. CHUNG, W.Y. CHANG, T. LIN, M.K. CHAO, C.S. LAM	17
A brief view of the current state of the development and aging performance of fixed frequency Surface Acoustic Wave (SAW) oscillator	
.....C.S. LAM, P.Y. SU, C.H. CHEN	21
Design of a double cavities piezoelectric peristaltic pump with finite element method	
.....Liang XU, Ming YANG, Wen-chu OU, Sang-di FU	26
Study on the vibration coupling of ultrasonic motor using longitudinal transducers.....	
.....Ying-xiang LIU, Wei-shan CHEN, Di LU, Xiao-hui YANG, Yu YAO	29
Non-symmetric dynamic characteristics of spherically symmetric piezoelectric shell.....	
.....Zu-guang YING	33
Study on a new linear ultrasonic motor with bending PZT elements	
.....Xiao-hui YANG, Wei-shan CHEN, Ying-xiang LIU, Jun-kao LIU	37
A novel rotary piezoelectric motor for aerospace application	
.....Xiao-long LU, Jun-hui HU, Chun-sheng ZHAO	41
Topology optimization of two-dimensional phononic crystals using FEM and genetic algorithm	
.....Hao-wen DONG, Xiao-xing SU, Yue-sheng WANG	45
Spot formation and alignment of silver nanowires using ultrasonic stage.....	
.....Yu-jie ZHOU, Jun-hui HU	49
2D noncontact manipulation of a single silver nanowire	
.....Hua-qing LI, Jun-hui HU	53
Research on locking device driven by ultrasonic motor for magnetic bearing flywheel	

..... Xiao-niu LI, Sheng-qiang ZHOU, Zhi-yuan YAO	57
Piezoelectric beam with non-uniform thickness for vibration energy harvesting	
..... Song-mao CHEN, Jin-juan ZHOU, Jing SUN, Jun-hui HU	61
Experimental investigation of characteristics of Chladni effect	
..... Xiao-bo ZHU, Jun-hui HU	65
Contact trapping, alignment and 3D transfer of a single nanowire using acoustic streaming	
..... Ning LI, Jun-hui HU	69
An experimental study on the structure of the internal impact type vibration energy harvester	
..... Jing SUN, Jun-hui HU, Jin-juan ZHOU, Song-mao CHEN	73
Studying the transducer with PMMA/Aluminium composite head by finite element method	
..... Hui-sheng LIU, Xi-ping MO	77
Theoretical and experimental study on a new structure free-flooded ring transducer	
..... Xin-ran XU	81
A U-shape transducer array of shallow water multi-beam sonar system	
..... Zhen-yu ZHENG	85
Analysis of the performance of underwater acoustic parametric array under different input signals	
..... Lin-lang BAI	89
SH-SAW propagation in a piezoelectric structure with viscoelastic layer	
..... Jing CUI, Jian-ke DU, Ting-feng MA, Ji WANG	93
Green's function for an electrically permeable crack in thermopiezoelectric materials	
..... Ai-bing ZHANG, Bao-lin WANG	97
A multi-modes cylindrical piezoelectric rotary motor with a single-vibrator	
..... Bin HE, Kai XU, Zeng-ping XING	101
Piezoelectrets: polymer foams for transducer applications	
..... Peng FANG, Zheng WEI, Guang-lin LI	105
Effects of a biasing electric field on Rayleigh waves in magnetoelectric structures	
..... Li-li YUAN, Jian-ke DU, Ting-feng MA, Ji WANG	109
A study on airborne piezoelectric transducer for geological simulation	
..... Sheng ZHOU, Chao CHEN	113
Large time-bandwidth product ultrasound generation by driving piezoelectric transducer	
..... Han ZHANG, Xiao-min WANG, Jie MAO, Ming-xuan LI, Guo-xuan LIAN, Zhi-wu AN	117
Self assembly of particles using phononic crystal slabs	
..... Qian WU, Fei-yan CAI, Hai-rong ZHENG, Zhi-wen CUI	123
A higher order zigzag theory for magnetoelectric composite beams	
..... Long ZOU, Hui-ming WANG	127
Exact analysis of the dynamic properties of 2-2 cement based piezoelectric actuator considering poling layer effect	
..... Tao-tao ZHANG, Kun MA, Zhi-fei SHI	131
Influence of curvature on magnetoelectric effect of three-layered piezoelectric/piezomagnetic composite cylinder	
..... Yong-kang WEI, Hui-ming WANG, Long ZOU	137
Structural dynamics design of axial/radial coupling non-contact piezoelectric ultrasonic motor with a spherical rotor	
..... Jun-shan WANG, Chao CHEN, Geng-chao CHEN, Xiao-jun YAN	140
Influence of initial stresses on resonance properties of FBAR	
..... De-jin HUANG, Xin-yi LUO, Ji WANG	144

PGC modulation based on PZT for fiber interferometric sensor.....	
..... De-sheng CHEN, Xiao-di HUANG, Hai-bin WANG, Lei JIANG	148
Research on driving power for dual-drive foot piezoelectric linear motor with dual-drive feet	
..... Guan-yin YU, Wei-qing HUANG, Wei-hua LIU, Song PAN	151
Design and analysis of a longitudinal piezoelectric vibration exciter.....	
..... Zhi-qiang LI, Xi-ping MO, Yao-zong PAN, Yong-ping LIU	155
DOA estimation of the moving targets in shallow water based on vector optimization beamforming and normal-mode theory	
..... Nan-song LI, Hai-yan SONG, Sheng-chun PIAO, Qing-xin MENG	159
The magnetolectric effects of terfenol-D/PZT/terfenol-D laminated structures	
..... Long XIA, Jian-ke DU, Ji WANG	163
Research on the S-type linear piezoelectric motor.....	
..... Sheng ZHANG, Wei-qing HUANG, Yin WANG	167
Simulation of broadband sound propagation in shallow water environments	
..... Li LI, Hai-gang ZHANG, Sheng-chun PIAO, Yun-he LI, Ya-xiao MO	171
Piezomagnetic love waves on orthotropic piezoelectric half-spaces.....	
..... Yan-ping KONG, Ruo-meng TIAN, Jin-xi LIU	175
Rayleigh waves in piezomagnetic/piezoelectric structures with biasing magnetic fields.....	
..... Qing-guo XIA, Jian-ke DU, Ji WANG	179
Band gaps calculation of scalar waves in two-dimensional phononic crystals with Generalized Multipole Technique (GMT)	
..... Zhi-jie SHI, Yue-sheng WANG, Chuan-zeng ZHANG	183
Numerical analyses on the sandwich dipole logging transducer with various loads	
..... Qiu-ying CHEN, Jian-sheng CONG, Xiao-min WANG, Xiu-ming WANG	187
Fabrication of Bulk Acoustic Wave resonator based on ALN thin film.....	
..... Jie YANG, Xiang-quan JIAO, Rui ZHANG, Hui ZHONG, Yu SHI	191
A method for improving the electrical limit of the Langevin ultrasonic transducer	
..... Zhao-feng LIANG, Xi-ping MO, Guang-ping ZHOU	195
Propagation of nonlinear longitudinal waves in an elastic rod	
..... Rong-xing WU, Lan-zhen YU, Wei SHI, Jing YU, Ji WANG	199
Mechanism on energy transmission control in beams based on a piezoelectric transducer.....	
..... Tian-zhu XU, Zhen-yu HUANG, Hai-li LIU	203
Deducing and verifying the frequency equation set of dual-frequency piezoelectric transducer.....	
..... Jia-he FU, Han-ying MAO, Zhen-feng HUANG, Han-ling MAO	207
Active piezoelectric-structure acoustic control of enclosed-cavity.....	
..... Li-jun LI, Shi-jie ZHENG	211
A microreactor using Surface Acoustic Wave as energy source	
..... Yan ZHA, An-liang ZHANG	215
Influence of Barium content on the properties and structure of low temperature sintered BCZT lead-free piezoelectric ceramics.....	
..... Chun-hua GAO, Xin-you HUANG, Zhi-wen ZHU	219
Study on signal crystal photo-elastic modulator based on Lithium Niobate piezoelectric and photo-elastic effect	
..... Dong-e ZHAO, You-hua CHEN, Zhi-bin WANG, Yuan-yuan CHEN,	

Li-fu WANG, Rui ZHANG	223
Correction factors for mindlin plate equations with the consideration of stiffness and mass effects of electrodes for SC-cut quartz crystal plates.....	
..... Gui-jia CHEN, Ji WANG, Wen-jun WANG, Rong-xing WU, Ting-feng MA, Jian-ke DU	229
Free vibration of fixed supported and multilayered magneto-electro-elastic plates	
..... Li-bo XIN, Zhen-dong HU	233
SH waves in functionally graded piezoelectric-piezomagnetic material structures	
..... Ruo-meng TIAN, Yan-ping KONG, Jin-xi LIU	237
The multicoupled magnetoelectric effect in three-phase $Tb_{1-x}Dy_xFe_2/Pb(Zr_{1-x}Ti_x)O_3/NdFeB$ bimorph laminates	
..... Zeng-ping XING, Kai XU, Bin HE	241
Crack detection of beam-structures based on transient waves	
..... Ji-qing JIANG, Wei-qiu CHEN, Gui-ru YE	245
2D and 3D GREEN'S functions for pyroelectric media	
..... Peng-Fei HOU, Jie TONG, Hai-Yang JIANG	249
Advances in design, growth and application of piezoelectric crystals with langasite structure.....	
..... Yan-qing ZHENG, Su-xian CUI, Jian-jun CHEN, Xiao-niu TU, Jun XIN	252
Resonant giant magnetoelectric effect of piezoelectric/magnet composites	
..... Kai XU, Bin HE, Jian-ke DU, Zeng-ping XING	260
A can method to image the quantitative bonding strength at the bonded solid-solid interface	
..... Jian-jun CHEN, De ZHANG, Yi-wei MAO	266
Analysis and development of plate-attached cylindrical rotary-linear ultrasonic motor	
..... Ting-hai CHENG, Xiang-dong GUO, Gang BAO, Han GAO, Cheng-feng XIAO	270
An analysis of frequency of a quartz crystal tuning fork resonator by modify Sezawa's theory	
..... Xiang-wu XU, Ji WANG, Zhen WANG, Ting-feng MA, Jian-ke DU	274
Analyses on dispersions and excitations of symmetric guided waves in a fluid-filled cylindrical shell.....	
..... Xi-qiang LI, Hao CHEN, Xiao HE, Xiu-ming WANG	277
Dipole source mismatch and its effects on sonic logging	
..... Hao CHEN, Xiu-ming WANG, Xiao HE, Xue-bing YANG	281
Measurement of the acoustic characteristics of ultrasonic phased array transducer	
..... Chun-guang XU, Ming-kai DENG, Ding-guo XIAO, Liu Yang, Hui-ling REN	285
Growth habits and high temperature properties of Langatate single crystal	
..... Xiao-niu TU, Yan-qing ZHENG, Hai-kuan KONG, Yi-fan TU, Kai-nan XIONG, Er-wei SHI	289
Temperature dependence of electro-elastic properties of Yttrium Calcium oxyborate single crystals	
..... Fa-peng YU, Xiu-lan DUAN, Shu-jun ZHANG, Yong-gui YU, Ting-feng MA, Xian ZHAO	293
Theory on the laser excited wave propagation in a single piezoelectric plate under a bias electric field	
..... Gen CHEN, Yong-dong PAN, Zheng ZHONG	298
Fast algorithm for the method of fundamental solution subjected to symmetry problems	
..... Li-na WU, Hai-e WEI, Quan JIANG	302
Theory on the Air-couple wave propagation in layered composite materials with laminate defect.....	
..... Song LING, Yong-dong PAN, Kao-shan DAI	306
Inversion of shear velocity profile in a cased borehole.....	
..... Ming-ming MA, Hao CHEN, Xiu-ming WANG, Xiao HE	310
The analytical solution and numerical simulation of the P-SV wave propagation in the piezoelectric laminate.....	

.....Lei LIU, Yong-dong PAN, Zheng ZHONG	314
Three-dimensional vibration analysis of the split electrode vibrator using finite element method.....	
.....Lin FU, Dong WANG, Xiu-ming WANG	318
Depth profiling of coating by laser ultrasonic technique.....	
.....Xue-hang SONG, Yong-dong PAN, Zheng ZHONG, Kao-shan DAI	322
Analysis of piezoelectric laminated plates using the layerwise plate theory and radial basis function collocation method.....	
.....Yu YIN, Lin-Quan YAO	326
Preparation and piezoelectric analysis of the multilayer films for FBAR.....	
.....Lin SU, Bao-he YANG, Cui-ping LI	330
Study on a high sensitivity tangential polarized acoustic-pressure hydrophone.....	
.....Hu ZHANG, Qi LI, Hong-juan CHEN, Wen-zhi WANG	334
Study on a high sensitivity and strong anti-jamming co-vibrating vector sensor.....	
.....Hu ZHANG, Hong-juan CHEN, Qi LI, Wen-zhi WANG	337
The measurement of elastic constants of quartz crystal by resonant ultrasound spectroscopy crystal by resonant ultrasound spectroscopy.....	
.....Zhen WANG, Ji WANG, Xiang-wu XU, Jian-ke DU, Ting-feng MA	341
Magneto-electro-elastic laminated plates with an elliptical hole subjected to out-of-plane bending moments.....	
.....Xiang-hua DAI, Cun-fa GAO	345
The anti-plane vibration of quartz plate with an additional partial non-uniform mass layer.....	
.....Peng LI, Feng JIN	349
SH wave propagation in a layered magneto-electric hollow cylinder.....	
.....Yong-dong PAN, Zheng ZHONG, Kao-shan DAI	353
Mindlin plate equations for the thickness-shear vibrations of circular elastic plates.....	
.....Wen-jun WANG, Ji WANG, Gui-jia CHEN, Ting-feng MA, Jian-ke DU	357
Frequency-temperature analysis of thickness-shear vibrations of SC-cut quartz crystal plates with the first-order mindlin plate equations.....	
.....Wen-jun WANG, Ji WANG, Gui-jia CHEN, Jian-ke DU, Ting-feng MA	361
Thickness-shear and thickness-twist modes in an oblate elliptical ceramic cylinder and energy trapping in contoured acoustic wave resonators.....	
.....Hui-jing HE, Jia-shi YANG, Yi-hua HUANG	365
Overtone-mode limits on AT-cut fundamental crystal resonator, through twice plating method.....	
.....Lin-lin ZHANG	369
Pressure-induced enhancement of piezoelectricity of quartz-like single crystals.....	
.....Kai-nan XIONG, Su-xian CUI, Yan-qing ZHENG, Er-wei SHI	373
Scattering problem of the interface circular cavity in piezoelectric media.....	
.....Lei LIU, Cun-fa GAO	379
Acoustic property of slightly compressible porous media and underwater structure-borne noise reduction.....	
.....Bo QIN	383
Design of temperature sensor array in smart electric grid based on saw resonators.....	
.....Yulin HAN, Zhen LI, Zhenwei QI, Yue HU, Bo-quan LIU, Tao HAN, Ji WANG	387
A novel approach to simulate low-loss surface acoustic wave devices using dispersive com parameters.....	
.....Hao WANG, Wei-biao WANG, Bo SU, Jian WANG, Hao-dong WU, Yong-an SHUI	391

Propagation of Bleustein-gulyaev wave in a piezoelectric crystal in contact with viscous conductive liquids	Feng-lin GUO, Guo-qing WANG	395
Asymmetric lamb wave propagation in graded grating phononic crystal slabs.....	Jiu-jiu CHEN, Hong-bo ZHANG, Xu HAN	399
Analysis on the pull strength's calculation method during the construction of oil pipeline directional drilling crossing the yellow river and improvement	Shi-qi XU, Bin LUO, Jun CHENG, Yuan-tai HU	402
The study of high-frequency broad-band underwater transducers.....	Kai ZHANG	408
Damage identification in a steel frame using high-frequency electro-mechanical impedance signatures	Wei WANG, Wei YAN, Ji WANG	411
A piezoelectric unimorph power harvester operating with coupled extension and flexure modes	Zi-yang LIAN, Lin HU, Jun CHENG, Yu-jue WANG, Hong-ping HU, Yuan-tai HU, Ji WANG	415
Dispersive characteristics of SH surface waves in semi-infinite magneto-electro-elastic layered periodic structures	Yu PANG, Zhen-hua SUN, Jin-xi LIU	419
Effects of boundary-layer thickness on aero-acoustics characteristics of subsonic shallow cavity flow	Dang-guo YANG, Jian-qiang LI, Jin-min LIANG, Yao-hua LI, Jun LIU	423
Numerical simulation investigation on parameters influencing synthetic-jet for active flow control	Dang-guo YANG, Jun LIU, Yi ZHANG, Jin-min LIANG, Yao-hua LI	427
Calibration of a thermal MEMS shear stress sensor array	Jin-min LIANG, Dang-guo YANG, Jian-qiang LI, Wei-min JIANG, Chun-yang LI	433
Dynamical characteristics research on the squeezed film damper stiffness rotor	Rui-hua ZHANG, Yin-fa ZHU, Zhi-wen XIONG, Yan-hui YE	438
An impermeable circular-arc crack in an electrostrictive material	Shi-juan WANG, Cun-fa GAO	443
Medical ultrasonic treatment and its applications in medicine	Yue-hua Yang, Shu-yu LIN	447
Author Index		451