

## Part 1/5

*Mini-Symposia, Special Program Events, Student Paper Competition,  
and Imaging Modalities and Systems***Mini-Symposia****BIOSENSORS: PAST ACHIEVEMENTS, PRESENT PROGRESS AND FUTURE CHALLENGES**

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A.P.F. Turner, Cranfield Institute of Technology, Bedford, UK
- ii: Overview of Biomembrane Biosensors** 0003  
H.G. Smith, TSI Mason Research Institute, Worcester, MA
- iii: Fabrication of Physical Sensors** 0004  
J.W. Knutti, IC Sensors Inc., Milpitas, CA
- iv: Micro Biosensors** 0005  
I. Karube, University of Tokyo, Tokyo, Japan
- v: Overview of the Application of Fiber Optic Biosensors** 0007  
D. Walt, Tufts University, Medford, MA
- vi: Materials for Implanted Biosensors** 0009  
M. Nichols, Nichols Technologies Inc., Columbia, MO

**BIOELECTRODES**

- vii: Electrode Polarization and Biological Impedances** 0011  
H.P. Schwan, University of Pennsylvania and Drexel University, Philadelphia, PA
- viii: Time Domain Analysis of the Fractal System for Electrode Polarization Phenomena** 0012  
H.H. Sun, A. Charef, Drexel University, Philadelphia, PA
- ix: A Fractal Description of the Electrochemical Response of Solid Electrodes** 0014  
R. deLevie, Georgetown University, Washington, DC
- x: Impedances of Sensor-Like Systems: Cells with Even or Odd Number of Interfaces** 0016  
R. Buck, University of North Carolina, Chapel Hill, NC

**PHYSIOLOGICAL SYSTEM IDENTIFICATION AND MODELING**

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V.Z. Marmarelis, University of Southern California, Los Angeles, CA
- xii: Some New Approaches to Nonlinear System Identification and Time-Series Analysis** 0020  
M.J. Korenberg, Queen's University, Kingston, Ontario, Canada
- xiii: Relationship of Time-Domain and Frequency-Domain Generalized Orthogonal Functional Expansions to Wiener Kernels** 0022  
J. Victor, Cornell University Medical College, New York, NY
- xiv: Analysis of a Nonlinear Cascade Model for Sensory Encoding by Modification of Ion Channels** 0025  
A.S. French and M.J. Korenberg\*, Univ. of Alberta, Edmonton, \*Queen's Univ., Kingston, Ontario, Canada
- xv: Interpretation of Wiener Kernels** 0027  
W. Krenz\* and L. Stark, University of California, Berkeley, CA, \*Aerospace Corp., Los Angeles, CA
- xvi: White Noise Analysis in Neurophysiology** 0028  
K-I. Naka, New York University Medical Center, New York, NY

**BIOMEDICAL APPLICATIONS OF FRACTALS AND CHAOS**

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R. Voss, IBM Research Div., Thomas J. Watson Research Center, Yorktown Heights, NY
- xviii: Fractal Measures of Correlation in Cardiovascular Signals** .  
R. King
- xix: Chaotic Dynamics on Videos** .  
J.A. Yorke

\* Paper not available for publication

- xx:** **Fractals and Chaos in Medicine** 0032  
A. Goldberger, Beth Israel Hospital and Harvard Medical School, Boston, MA
- xxi:** **Deterministic Sand Pile: Route to Chaos in Large Systems** 0033  
S.H. Liu, T. Kaplan and L.J. Gray, Oak Ridge National Laboratory, Oak Ridge, TN

### Special Session

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- Dov Jaron, Drexel University
- xxiii:** **A Standard for Everything** 0034  
Mort Levin, Mort Levin, Inc., Natick, MA
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- xxvi:** **Trends and Issues Facing the Global Medical Device Industry** \*
- Matthew Gallivan, Health Industry Manufacturers Association
- xxvii:** **The Role of the FDA in Facilitating Global Standards** \*
- Elizabeth D. Jacobson, FDA/CDRH
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\*Laurie Imaging Center, UMDNJ-RWJ, New Brunswick, NJ
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James W. Hugg, Gerald B. Matson, Andrew A. Maudsley, Donald B. Twieg*, Dominique Sappey-Mariniér, and Michael W. Weiner, Magnetic Resonance Spectroscopy Unit, VA, Univ. of CA, *Philips Medical Sys.	
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C. Hamrouche*, L.M. Luo**, R. Collerec*, A. Bruno*, *Unite INSERM 335, L.T.S.I. Univ. de Rennes, Rennes Cedex, France, **Dept. Biomedical Engineering, Southeast Univ., Nanjing, China	
<b>20.11-1: Angiographic Workstation Based on a Macintosh II</b>	<b>0217</b>
Y. Sun, J.F. Friend*, Dept. of Elect. Eng., Univ. of Rhode Island, Kingston, Rhode Island, *XRE Corp., Littleton, Massachusetts	



<b>20.11-2: A NeXT-Based High Performance Image Computing Workstation for Biomedical Applications</b>	<b>0219</b>
Yongmin Kim, and Clark D. Haass, Image Computing Systems Laboratory, Dept. of Electrical Engineering, Univ. of Washington, Seattle, WA	
<b>20.11-3: 3D Brain Anatomy and Surgery in X-11 Environment</b>	<b>0221</b>
F. Beltrame, F. Bonadonna, C. Giorgia*, G. Marcenaro, DIST - Universita de Genova and *Istituto Neurologico C. Besta - Milano, Genova, Italy	
<b>20.11-4: PC-based Comp. Approach for the Simulation of Stereotactic Surgery</b>	<b>0224</b>
S.K. Yoo*, N.H. Kim**, J.M. Huh**, S.H. Kim***, *Dept. of Electrical Eng., Soonchunhyang Univ., **Dept. of Medical Eng., ***Dept. of Neurosurgery, Yonsei Univ., Seoul, Korea	
<b>20.11-5: Inter-Hospital Tele-Radiology via Integrated Service Digital Networks and Local Area Networks</b>	<b>0226</b>
Xiaobing Lee*, Lu Lee**, Dali Tao***, *S. Western Bell Corp Tech. Res. Inc., St. Louis MO, **Good Samaritan Hosp. & Med. Cnt., Portland, OR ***State Univ. of NY at Stony Brook	
<b>20.11-6: Automatic Analysis and Interpretation of Medical Images</b>	<b>0228</b>
R. Beuscart, P. Roussel, M. Wartsky, P. Dubois, and R. Vergnes, CERIM- Faculte de Med. de Lille, SCMN-Hopital B, Lille, France	
<b>P.20-1 Shape Based Three Dimensional Mapping of Left Ventricular Aneurysm</b>	<b>0230</b>
Haim Azhari, Rafael Beyar, Melvin L. Marcus*, Samuel Sideman, The Julius Silver Inst., Dept. of Biomedical Eng., Technion, Israel Dept. of Internal Medicine, Univ. of Iowa Hospital, Iowa	
<b>P.20-2 A Pixel-Connecting Feedback Network for Image Processing: An Overview</b>	<b>0232</b>
J.H. Yanof*, K.M. Mudy *Picker Internat'l, Inc. Highland Hts., Ohio, The Biomed. Imaging Lab., Dept. of Biomed. Eng., The Univ. of Akron, Akron, Ohio	
<b>P.20-3 Contribution of Factor Analysis to the Study of Renal Graft Perfusion</b>	<b>0233</b>
T. Hermann, D. Granjon, M. Voultay, P. Rusch and P. Levy, Fac. of Medicine, Laboratoire de Biophysique, Saint-Etienne, France	
<b>P.20-4 On the Emission/Detection Process Modeling for Medical Imaging</b>	<b>0235</b>
V.A. Oliveira* and J.M. Nightingale**, *Depto de Electricidade, Escola de Engenharia de Sao Carlos, Universidade de Sao Paulo - Brazil, **Dept. of Elec. Engr., Univ. of Southampton, UK	
<b>P.20-5 RBC Velocity Distribution in the Microcirculation Estimated From the Optical Flow of Blood Image Sequence</b>	<b>0237</b>
Haruyuki Minamitani*, Jun Umetani*, Eiji Okada*, Yuji Agawa*, Eichi Sekizuka**, Chikara Oshio**, Yoshinari Hozawa**, Makoto Suematsu+, and Masaharu Tsuchiya+, *Yokohama, **Saitama, +Tokyo, JA	
<b>P.20-6 A New Approach to Enhance the X-Ray CT Image</b>	<b>0240</b>
David Talwar, GE Medical Systems, Milwaukee, WI	
<b>P.20-7 Variability of CT Point Spread Function within the Field of View</b>	<b>0242</b>
S. Dore*, R.E. Kearney*, J.De Guise**, *Dept of Biomedical Engr., McGill University, **Institut de Genie Biomedical, Ecole Polytechnique de Montreal	
<b>P.20-8 Infrared Laser Read-Out of a tLD Plate for High Dose Radioactive Field Quantitative Imaging</b>	<b>0244</b>
M.E. Grupen-Shemansky* and K.J. Kearfott, *Semiconductor Products Sector, Motorola, Inc., Nuclear Engineering and Health Physics Programs, Georgia Institute of Technology	

**Track 21: Medical Ultrasound**

<b>21.1-1: Biological Effects of Lithotripter Fields</b>	<b>0246</b>
Edwin L. Carstensen, Rochester Center for Biomedical Ultrasound, Department of Electrical Engineering, University of Rochester, Rochester, NY	
<b>21.1-2: Improvement of the Reproducibility and the Efficiency in Electrohydraulic Generators By Using Conducting Liquid</b>	<b>0247</b>
D. Cathignol*, J.L. Mestas*, P. Dancer**, F. Gomez* and P. Lenz*, *INSERM Unite 281, Lyon Cedex 03, **Technomed, Parc Club, Venissieux, France	
<b>21.1-3: Microhardness Properties of Gallstones and Synthetic Stones</b>	<b>0249</b>
S.M. Gracewski, Nimish Vakil, E. Carr Everbach, and S.J. Burns, University of Rochester, Rochester, NY	
<b>21.1-4: Shock Wave Lithotripter Positioning by Incoherent Ultrasonic Wave Scattering on Cavitation Bubbles in the focus Region</b>	<b>0250</b>
E. Hausler and V. Rech, Department of Electrical Engineering, Saarland University, Saarbrücken, West Germany	
<b>21.1-5: The Effects of Errors in Positioning Lithotripter and Imaging Kidney Stones Ultrasound</b>	<b>0252</b>
R.M. Schmitt*, H. Wurster**, W. Kraus**, M. Bibinger*, *FhG Biomedical Department, St. Ingbert, **Fa. Wolf, Knittlingen, West Germany	



<b>21.2-1: Use of Ultrasonic CT for Imaging Acoustic Nonlinearity Parameter</b>	<b>0254</b>
C.M. Schgal*, T. Kinter**, J.F. Greenleaf** *Hahnemann Univ., Philadelphia, PA, **Mayo Clinic, Rochester, MN	
<b>21.2-2: The Effects of Nonlinear Propagation in Ultrasound Hyperthermia</b>	<b>0256</b>
K. Hynynen, Arizona Cancer Center and Dept. of Radiation Oncology, Univ. of Arizona Health Sciences Center, Tucson, AZ	
<b>21.2-3: Temperature Elevation Measurements in Rat Fetuses During Ultrasound Exposure</b>	<b>0258</b>
Varkey Abraham and Marvin C. Ziskin, Department of Diagnostic Imaging, Temple University School of Medicine, Philadelphia, PA	
<b>21.2-4: Biochemical Effects of Ultrasound on the Developing Rat Central Nervous System</b>	<b>0260</b>
N. Margulies, V. Abraham, & M.C. Ziskin, Department of Diagnostic Imaging, Temple University School of Medicine, Philadelphia, PA	
<b>21.2-5: The Effect of Ultrasound on Neonatal Cerebral Blood Perfusion</b>	<b>0262</b>
L.F. Muscarella, U. Vastare*, R. Tuma*, V. Abraham, M. Ziskin, Department of Diagnostic Imaging, *Department of Physiology, Temple University School of Medicine, Philadelphia, PA	
<b>21.3-1: Hyperthermia: Field Conjugate Acoustic Lenses for Deep Heating</b>	<b>0264</b>
R. Lalonde, A. Worthington, J.W. Hunt Ontario Cancer Inst. & Dept. of Med. Biophysics, Univ. of Toronto, Toronto, Ontario, Canada	
<b>21.3-2: Synthesis of Optimal Hyperthermia Field Patterns with Ultrasound Phased-Array Applications</b>	<b>0266</b>
Charles A. Cain and Emad S. Ebbini, Electrical Engineering and Computer Science Departments, The University of Michigan, Ann Arbor, MI	
<b>21.3-3: A Focused Ultrasound Heating Technique to Measure Perfusion</b>	<b>0268</b>
G.T. Anderson, G. Burnside, Dept. of Elect. and Inst., The Univ. of Arkansas at Little Rock, Arkansas	
<b>21.3-4: A Concentric Ring Ultrasound Applicator for Hyperthermia</b>	<b>0270</b>
T.P. Ryan**,***,**** A. Hartov**, J. Taylor***, J. Stafford*** T. Colacchio****, **Thayer School of Eng., Dartmouth Coll., NH, *** Sect. of Rad. Ther., Dept. of Med. & ****Dept. of Surg. Dartmouth Med. School, NH	
<b>21.3-5: An Experimental Ultrasound Phased Array for Intracavitary Hyperthermia</b>	<b>0272</b>
C.J. Diederich, K. Hynynen, Univ. of Arizona, Radiation Oncology Dept., Tucson, AZ	
<b>21.3-6: Rate of Heating in Tissue In Vitro by Interstitial Ultrasound</b>	<b>0274</b>
Boguslaw J. Jarosz, Carleton Univ., Dept. of Physics, Ottawa, Canada	
<b>21.4-1: The Development of 1-3 Piezoelectric Composites and its Impact on Medical Ultrasonic Imaging Transducer Design</b>	<b>0276</b>
C.G. Oakley, Echo Ultrasound, Reedsville, PA	
<b>21.4-2: Real-time Phase Aberration Correction System for Medical Ultrasound Imaging</b>	<b>0278</b>
M. O'Donnell and W.E. Engeler, GE Corp. Res. & Dev. Center, Schenectady, NY	
<b>21.4-3: An Experimental Investigation of Fundamental Limitations on Ultrasonic Field Reconstruction</b>	<b>0281</b>
Chris Vecchio and Peter A. Lewin, Department of Electrical and Computer Engineering and the Biomedical Engineering and Science Institute, Drexel University, Philadelphia, PA	
<b>21.4-4: Acoustic Impedance Reconstruction of Layered Media with High Resolution</b>	<b>0283</b>
Jing Bai and Wenkang Qi, Dept. of Electrical Engineering, Tsinghua University, Beijing, P.R. China	
<b>21.4-5: Ultrasound Measurement Techniques for Determination of Limb Volume</b>	<b>0285</b>
F. Batsch, G. Plath, J. Buckley*, G. Blomqvist*, M. Klein**, R. Schmitt**, Div. of Space Medicine, DLR, Inst. for Aerospace Medicine, FRG, *Div. of Cardiology, Univ. of TX, **Fraunhofer Inst. NDT, FRG	
<b>21.4-6: A 100-Element Ultrasonic Circular Array for Endoscopic Application in Medicine and NDT</b>	<b>0287</b>
H.-P. Schwarz, H.-J. Welsch, P. Becker, R. M. Schmitt, Fraunhofer Institute for NDT and Saarland University, St. Ingbert, W. Germany	
<b>21.5-1: Common Misconceptions About the Scattering of Ultrasound by Blood</b>	<b>0291</b>
L.Y.L. Mo*, R.S.C. Cobbold*, K.K. Shung** *Inst. of Biomedical Eng., Univ. of Toronto, Toronto, Canada **Bioeng. Prog. PA State Univ., Univ. Park, PA	
<b>21.5-2: Rational Attenuation Compensation via Adaptive Digital Filtering</b>	<b>0293</b>
W.R. Dreschel*, K.K. Shung, The Bioengineering Program, Penn State Univ., University Park, PA *Also Sound Technology, Inc., State College, PA	
<b>21.5-3: A Refractive Device for Enlarging the Diagnostic Range of B-Scan Ultrasonic Imaging Systems</b>	<b>0295</b>
Wu Ping, C. Jingzhi, T. Chong, Dept. of Information & Control Eng., Xi'an Jiaotong Univ., Xi'an Xi'an Electric Power Central Hospital, Xi'an, P.R. China	



<b>21.5-4: Digital Scan Converter with Real-time Correction of Refractive Geometric Distortion of B-Scan Imaging</b>	<b>0297</b>
W. Ping, Y. Dijing, C. Jingzhi, Dept. of Information & Control Eng., Xian Jiaotong Univ., Xian, P.R. China	
<b>21.5-5: Ultrasonic Propagation Properties (at 100 MHz) in Liver of Rat Exposed to Ethanol or Carbon Tetrachloride</b>	<b>0299</b>
P. Tiernan*, K. McCauley**, T. Hebner*, J. Erdman Jr.**+, W.D. O'Brien*, **, *The Bioacoustics Research Lab., **The Div. of Nutritional Sciences, +Dept. of Food Sciences, Univ. of Illinois, Urbana, IL	
<b>21.5-6: High Resolution Normal and Focalised Ultrasonic Transducers for Echography</b>	<b>0301</b>
M. Savu, M. Omer, and M. Dinca, Romanian Society for Clinical Engineering & Medical Computing, Bucharest, Romania	
<b>21.6-1: A Time and Frequency Domain Description of an Ultrasound Pulsed Doppler System</b>	<b>0303</b>
Jeff Powers, Advanced Technology Laboratories, Bothell, WA	
<b>21.6-2: The Effect of Hematocrit and Shear Rate on the Doppler Spectrum Under Steady and Pulsatile Flow</b>	<b>0306</b>
K. K. Shung, C. Lim, Bioengineering Program, Pennsylvania State Univ., Univ. Park, PA	
<b>21.6-3: A Simulation to Study the Effect of Device Parameters on Optimal Doppler Spectral Analysis Methods</b>	<b>0308</b>
S.A. Jones, D.P. Giddens, Dept. of Aerospace Eng., Georgia Inst. of Technology, GA	
<b>21.6-4: High-Resolution and Low Variance, Real-time Spectral Analysis of Doppler Signals</b>	<b>0310</b>
A. Herment, *G. Demoment, P. Dumee and *C. Arcle, INSERM U256, Paris, France, *L2S ESECNRS, Gif sur Yvette, France	
<b>21.6-5: Axial Ultrasonic Blood Flow Velocity by the Minimum Variance Flow</b>	<b>0312</b>
N. F. Guler, and I. Guler, Dept. of Electronic Engr., Erciyes University, Kayseri, Turkey	
<b>21.7-1: Quantitative Analysis of Doppler Color Flow Images in a Model of Arterial Stenosis</b>	<b>0314</b>
Hari M. Vattiyam, and Stanley E. Rittgers, Department of Biomedical Engineering, The University of Akron, Akron, Ohio	
<b>21.7-2: A New Mean-Frequency Estimator For Short Data Segments: Application to Doppler Color Imaging</b>	<b>0316</b>
A. Herment, J.P. Guglielmi and C. Pellot, INSERM, U256, Paris, France	
<b>21.7-3: Ultrasonic Interferometry Application to Study of Blood</b>	<b>0318</b>
M. Boynard*, S.M. Razavian*, R. Guillet*, Y. Beuzare**, Lab. de Biophysique Appliquee, UFR Biomedicale des Saints Peres, France, **INSERM, Creteil, France	
<b>21.7-4: Construction and Matching of Ultrasonic Transducer for Pulsed Doppler Blood Flowmeter</b>	<b>0320</b>
I. Guler and N. F. Guler, Dept. of Electronic Engr., Erciyes Univ., Kayseri, Turkey	
<b>21.7-5: Intravenous Contrast Agent for Ultrasound Doppler: In Vivo Measurement of Small Tumor Vessel Dose - Response</b>	<b>0322</b>
P.N. Burns, P. Hilpert, B.B. Goldberg, Thomas Jefferson Univ. Hosp., Philadelphia, PA	
<b>21.8-1: Assessment of Myocardial Viability with Analysis of Ultrasonic Integrated Backscatter</b>	<b>0325</b>
Julio E. Perez, James G. Miller, Samuel A. Wickline, Benico Barzilal and Burton E. Sobel, Departments of Medicine and Physics, Washington University, St. Louis, MO	
<b>21.8-2: Imaging Structural Properties of Soft Tissues Using Ultrasound</b>	<b>0327</b>
T.J. Hall, M.F. Insana, J.L. Fishback*, S.J. Rosenthal, Dept. of Diagnostic Radiology & *Dept. of Pathology, Univ. of Kansas Med. Cntr., Kansas City, Kansas	
<b>21.8-3: A Fast and Stable In-Vivo Attenuation Estimation Method</b>	<b>0329</b>
K. Murakami, A. Shiba, I. Yamada, T. Shimura, Medical Elect. Lab., FUJITSU Lab. Ltd.	
<b>21.8-4: Detection of Specular Reflections and Suppression of Speckle by Phase Filtering</b>	<b>0331</b>
D. Kim, J.F. Greenleaf, T.M. Kinter, R.R. Kinnick Biodynamics Research Unit, Dept. of Physiology and Biophysics, Mayo Clinic/Foundation, Rochester, MN	
<b>21.8-5: Moments and Phase of Non-Rayleigh Speckle Statistics Applied to Ultrasound Image Analysis</b>	<b>0333</b>
Li Weng, John M. Reid, Mohana Shankar, Kawan Soetanto, Yue Li, Xuanming Lu, Harry Oung, Ramesh Raghavan, Vladimir Genis and A. William Schmidt, Biomedical Eng. & Sci. Inst., Drexel Univ., PA	
<b>21.8-6: Tissue Characterization Using Bayes Classifier</b>	<b>0335</b>
N. Botros, S. Salhab, Dept. of Elect. Eng., Southern Illinois Univ., Carbondale, IL	
<b>21.9-1: Three-Dimensional Presentations of Ultrasonic Images and Spectral Parameters for Tissue Characterization</b>	<b>0337</b>
Ernest J. Feleppa, Frederic L. Lizzi, Anne E. Dumke, and Angle Rosado, Riverside Research Institute, New York, NY	



<b>21.9-2: In-Vivo Measurement of Osteoporotic Bone Fragility with apparent Velocity of Ultrasound</b>	<b>0338</b>
G. Brandenburger, L. Avioli*, C. Chesnut III**, R. Heaney***, S. McDougal, C. Olson, R. Recher***, C. Turner***, Osteo-Tech., Inc., Framingham, MA *Washington U., St. Louis, MO, **U. of Washington, Seattle, WA, ***Creighton	
<b>21.9-3: Synthesis of Scatter and Absorption Weighted Ultrasound CT Images</b>	<b>0340</b>
C.M. Sehgal, P.J. Thomas*, J.F. Greenleaf*, Hahnemann Univ., Philadelphia, PA, *Mayo Clinic, Rochester, MN	
<b>21.9-4: Near-field Reconstruction of Transesophageal Echocardiographic Images</b>	<b>0342</b>
David S. Buckles, Derek A. Fyfe, Division of Pediatric Cardiology, Medical Univ. of South Carolina, SC	
<b>21.9-5: Estimation of the Slope of the Attenuation Coefficient Using Integral Spectrum Moment</b>	<b>0344</b>
Q. Zhang, B. Wang, G. H. Meng, Dept. of Information & Control Eng., Xian Jiaotong Univ., Xian, Shaanxi, People's Republic of China	
<b>P.21-1 Digital Image Processing for Phased-Array Ultrasound Scanning System</b>	<b>0346</b>
Wang Suping, Li Tiangang, Huang Yuxing, Information & Control Eng. Dept., Xi'an Jiaotong Univ. Xi'an, Shaanxi, China	
<b>P.21-2 Ultrasonic Endoscope Based on a Low Cost Personal Computer</b>	<b>0348</b>
Malcolm Clarke*, David Simpson**, Derek Rutt+, Norman Browne+, *Dept. of Elec. Engr., Brunel Univ., Uxbridge, **Dept. of Computing, Imperial College, London, +Dept. of Surgery, St. Thomas Hos., London	
<b>P.21-3 Ultrasound Velocity in Cervix Uteri in Correlation with Structural Changes for Diagnosis of Incompetence</b>	<b>0350</b>
Abou Bakr M. Youssef, Mohammed F. Shaloot, Amr A.R. Sharawi, Ahmed Badawi, Noha M. Ahmed, Cairo University, Giza, Egypt	
<b>P.21-4 Thyroid Tissue Characterization Using Computerized Ultrasound B-Mode</b>	<b>0352</b>
Abou Bakr M. Youssef, Ahmed I. Badran, Amr A.R. Sharawi, Amr G. Ahmad, Cairo University, Giza, Egypt	
<b>P.21-5 Effect of the Bandwidth of Receiving Transducer on Pulsed Doppler System</b>	<b>0354</b>
Y. Zhang, S. Hou, Q. Chen and H. Zhao, Shaanxi Teachers University, P.R. China	
<b>P.21-6 A New Efficient Method to Compute Ultrasound Fields on a Personal Computer</b>	<b>0356</b>
A. Hartov*, W. Strohbehn*, T. Colacchio**, *Thayer School of Engineering, Dartmouth College, Hanover, NH **Dartmouth Hitchcock Medical Center, Hanover, NH	

## Track 29: Reconstruction and Display in Tomographic Radiology

<b>29.1-1: Reconstruction of CT Images by Convex Projections</b>	<b>0359</b>
H. Stark, Illinois Inst. of Technology, Dept. of Electrical and Computer Engr., Chicago, IL	
<b>29.1-2: Evaluation and Optimization of Iterative Reconstruction Techniques</b>	<b>0361</b>
G. T. Herman, and D. Odhner, Medical Image Processing Group, Dept. of Radiology, University of Pennsylvania, Philadelphia, PA	
<b>29.1-3: Resolution Enhancement of Reconstructed Images by Using Image Restoration Techniques</b>	<b>0364</b>
S. Kuo, R. Mammone, J. Doherty, C. Podilchuk, Dept. of Elect. & Comp. Eng., CalP Center, Rutgers Univ., Piscataway NJ	
<b>29.1-4: An Iterative Approach to Sinogram Restoration</b>	<b>0366</b>
J.L. Prince, Image Analysis and Communications Laboratory, Dept. of Electrical and Computer Engineering, The Johns Hopkins University, Baltimore, MD	
<b>29.1-5: Iterative CT Reconstruction Using Reprojection</b>	<b>0368</b>
C. R. Crawford and A. H. R. Lonn, GE Medical Systems, Milwaukee, WI	
<b>29.1-6: Vector Extrapolated Fast ML Algorithms for Emission Tomography</b>	<b>0370</b>
N. Rajeevan, Department of Electrical Engineering, Indian Institute of Science, Bangalore, India	
<b>29.2-1: CT Algorithms with Linograms</b>	<b>0372</b>
Paul R. Edholm, Department of Radiology, University of Linköping, Linköping, Sweden	
<b>29.2-2: Three-Dimensional Linogram Reconstruction: Application to Magnetic Resonance Imaging</b>	<b>0374</b>
David A. Roberts, Department of Biochemistry and Biophysics, University of Pennsylvania, PA	
<b>29.2-3: Noniterative Spect Algorithms</b>	<b>0376</b>
W.G. Hawkins, N-C Yang, P.K. Lechner, The Johns Hopkins Medical Institutions, Dept. of Radiation Oncology, MD	
<b>29.2-4: Resolution Improvement in Spect by Spatial Filtering</b>	<b>0379</b>
W. Xia, R. M. Lewitt, P. R. Edholm*, Dept. of Radiology, Univ. of Pennsylvania, Philadelphia, PA, *Dept. of Diagnostic Radiology, Univ. of Linköping, Sweden	



<b>29.2-5: A Method of Image Reconstruction Using Spline Harmonics</b>	<b>0381</b>
W.K. Cheung*, G.T. Herman*, and A. Markoc**, *Medical Image Processing Grp., Dept. of Radiology, Univ. of Pennsylvania, Phil., PA, **Dept. of Mathematics, Rider College, Lawrenceville, NJ	
<b>29.2-6: Three Dimensional Image Reconstruction by Reprojection</b>	<b>0383</b>
P.E. Kinahan, J.S. Karp, Dept. of Nuclear Medicine, Div. of Radiology, Univ. of PA, Philadelphia PA	
<b>29.3-1: Automated Production of Custom Bone Replacements</b>	<b>0385</b>
S.J. Bresina**, M.W. Vannier*, S. Tepic**, S.M. Perren**, *Washington University School of Medicine, St. Louis, MO and **Laboratory for Experimental Surgery, Davos, Switzerland	
<b>29.3-2: The Biological Implications of Varying Element Design in Finite-Element Scaling Analyses of Growth</b>	<b>0387</b>
J.T. Richtsmeier*, G.R. Morris**, J.L. Marsh***, M.W. Vannier****, *Dept. of Cell Biol. & Anatomy and **Civil Eng., The Johns Hopkins Univ., Baltimore, MD ***Cleft Palate & Craniofacial Deform. Inst.	
<b>29.3-3: Three Dimensional Solid Modeling of the Canine Biventricular Unit</b>	<b>0389</b>
J.S. Pirolo, S.J. Bresina*, M.W. Vannier*, D.G. Gayou*, J.L. Cox and M.K. Pasque, Div. of Cardiothoracic Surgery and *Mallinckrodt Inst. of Radiology, Barnes Hosp., St. Louis, MO	
<b>29.3-4: Microcomputer-Based Workstations for Radiographic Periodontal Disease Quantification</b>	<b>0392</b>
Charles F. Hildenbolt*, Michael W. Vannier*, & Michael K. Shrout**, *Mallinckrodt Institute of Radiology, St. Louis, MO, **Medical College of Georgia, Augusta, GA	
<b>29.3-5: Diseased Tissue Identification and Quantification Utilizing MRI</b>	<b>0394</b>
M.B. Merckel, T. R. Jackson, K.S. Spetz and W.T. Katz, Biomedical Engineering, University of Virginia	
<b>29.3-6: Computer Based Identification of White Matter Lesions</b>	<b>0396</b>
I. Dapouleas, Medical Image Processing Group, Dept. of Radiology, Univ. of PA, Philadelphia, PA	
<b>29.4-1: Characteristics of Parallel Medical Imaging Algorithms</b>	<b>0398</b>
Leah H. Jamieson and Edward J. Delp, School of Electrical Engineering, Purdue University, IN	
<b>29.4-2: Parallel Computing in Bayesian Image Reconstruction</b>	<b>0400</b>
Chin-Tu Chen, Caesar Ordonez, Xiaolong Ouyang, and Wing H. Wong*, Dept. of Radiology and *Dept. of Statistics, University of Chicago, Chicago, IL	
<b>29.4-3: A Multigrid Expectation Maximization Algorithm for Emission Tomography: Parallel Implementation</b>	<b>0402</b>
M.V. Ranganath, AT&T Bell Laboratories, AT&T Pixel Machines, Holmdel, NJ	
<b>29.4-4: Real Time CT Reconstruction</b>	<b>0405</b>
X. Zheng and J.A. Pearce, Elect. & Comp. Eng. Dept., The Univ. of Texas at Austin, TX	
<b>29.4-5: Interactive Volume Rendering Using the Pixel Machine</b>	<b>0407</b>
Yuh-Tay Liow, M. Reha Civanlar, Steven C. Dzik, AT&T Bell Laboratories, Pixel Machines, Holmdel, NJ	
<b>29.4-6: Massively Parallel Solution of Entropy Optimization Problems</b>	<b>0409</b>
Stavros A. Zenios, Decision Sciences Dept., Univ. of Pennsylvania, Philadelphia, PA, and Thinking Machines Corporation, Cambridge, MA	
<b>29.5-1: Volume and Surface Rendering</b>	<b>0411</b>
Jauaram K. Udupa and Hsiu-Mei Hung, Department of Radiology, Medical Image Processing Group, University of Pennsylvania, Philadelphia, PA	
<b>29.5-2: Rationale for Surface Extraction from Solid Three Dimensional Volume Images</b>	<b>0413</b>
C. Cutting, F. Bookstein*, M. Noz, Inst. of Reconstructive Plastic Surgery, NY Univ. Med. Cntr, NY, NY *Center for Human Growth & Dev., Univ. of Michigan, Ann Arbor, MI	
<b>29.5-3: Automatic Quantification of Myocardial Defects in Spect By Morphological Methods</b>	<b>0415</b>
Jean-Christophe Cauvin*, Jean-Yves Boire**, Jean Maublant*, Michel Zanca+, Annie Veyre+, Centre Jean Perrin*, Dept. of Biomathematics**, INSERM U71+, Faculty of Medicine, France	
<b>29.5-4: Vertebral Computed Tomography Image Segmentation for Trabecular Architecture Assessment</b>	<b>0417</b>
J.J. Kaufman, M. Hatem, J. el-Batal, M. Figueiredo, P. Nasser, M. Mont, A.A. Pilla, R.S. Siffert, Dept. of Orthopaedics, Mt. Sinai School of Med., NY, NY	
<b>29.5-5: A Moment-Based Three-Dimensional Edge Operator</b>	<b>0419</b>
Limin Luo*, Jean-Louise Coatrieux**, C. Hammitouche**, *Dept. of Biomedical Engr., Image Processing Lab., Southeast Univ., Nanjing, China, **Unite INSERM 335, Univ. de Rennes-I, Rennes, France	
<b>29.5-6: Segmentation Methods for Automatic Kidney Volume Quantification in Spect</b>	<b>0421</b>
J.-Y. Boire*, J.-C. Cauvin**, P. Cluzel+, M. Lahellec**, J. Maublant**, M. Zanca**, and A. Veyre**, Dept. of Biomathematics*, Jean Perrin Ctr. and INSERM U71**, Dept. of Nephrology+, France	



<b>29.6-1: Tumor Localization and Identification</b>	<b>0423</b>
P. Bloch*, Mark Bryer*, R.E. Lenkinski, W.G. McKenna*, Univ. of PA, Schl. of Med., *Departs: Radiation Oncology, **and Radiology, Philadelphia, PA	
<b>29.6-2: Conformal Treatment Planning and Interactive Graphics</b>	<b>0425</b>
Daniel L. McShan, Dept. of Radiation Oncology, University of Michigan, Ann Arbor, MI	
<b>29.6-3: Recent Advances in 3D Treatment Planning - Feasibility</b>	<b>0426</b>
M.D. Altschuler, Dept. of Radiation Oncology, School of Med., Univ. of Pennsylvania, Philadelphia, PA	
<b>29.6-4: Recent Advances in 3-D Treatment Planning Using a Graphics Supercomputer</b>	<b>0428</b>
Marc R. Sontag, Division of Radiation Oncology, Duke University Medical Center, Durham, NC	
<b>29.6-5: Computer Assisted Interventionist Imaging: Application to the Vertebral Column Surgery</b>	<b>0430</b>
B. Mazier, S. Lavallee, P. Cinquin, Lab. d'Informatique Medicale, La Tronche, France	
<b>29.6-6: Visualization Requirements for Medical Treatment Planning</b>	<b>0432</b>
E. L. Buhle, Jr., Univ. of PA School of Medicine, Dept. of Radiation Oncology, Philadelphia, PA	

### Track 30: Student Paper Competition

<b>30.1-1: Linear Discriminant Based Mammographic Tumor Classification Using Shape Descriptors</b>	<b>0434</b>
J. Kilday, F. Palmieri, M. D. Fox, Dept. of Elect. and Systems Eng., Univ. of CT, Storrs, CT	
<b>30.1-2: Selective Magnetic Stimulation of the Spinal Cord</b>	<b>0436</b>
O. Hiwaki and S. Ueno, Department of Electronics, Kyushu University, Fukuoka, Japan	
<b>30.1-3: A Robust Left Venticular Edge Detector for Gated Nuclear Cardiac Scintigrams</b>	<b>0438</b>
M.J. Svihura and R.A. Stein, University of Calgary, Calgary, Canada	
<b>30.1-4: In-Situ Characterization of Adsorbed Protein Films Using Surface Plasmon Resonance</b>	<b>0440</b>
R.C. Jorgenson, S.S. Yee, K.K. Chittur* and L.W. Burgess+, Dept. of Elec. Engr., Univ. of Washington, Seattle, WA; *Case Western Reserve Univ., Cleveland, OH, +Cent. for Process Anal. Chem., Univ. of Washington, Seattle, WA	
<b>30.1-5: Bilirubin Conjugation in a Three Compartment Hollow Fiber Bioreactor</b>	<b>0443</b>
Scott L. Nyberg, Russell A. Shatford, Frank B. Cerra, Wei-Shou Hu, Departments of Biomedical Engineering and Surgery, University of Minnesota, Minneapolis, MN	
<b>30.1-6: Transport and Metabolism of LDL in the Rabbit Aorta Wall in Vivo: A Role for the LDL Receptor?</b>	<b>0445</b>
Evan D. Morris, Gerald M. Saidel, and Guy M. Chisolm III, Cleveland Clinic Foundation and Case Western Reserve University, Cleveland, OH	
<b>30.2-1: Transient Modification of Membrane Potential and Conductance by Single Ultrasound Bursts Modulates Neuronal Excitability</b>	<b>0447</b>
R.T. Mihran, F.S. Barnes, H. Wachtel, Dept. of Elect. & Comp. Eng., Univ. of Colorado, Boulder, CO	
<b>30.2-2: Equivalent Dipole Properties of Intracavitary Potentials During Myocardial Infarction</b>	<b>0449</b>
K.L. Milligan, F.J. Claydon, D.M. Mirvis, Dept. of Elect. Eng., Memphis State Univ., Dept. of Biomedical Eng. and Medicine, Univ. of Tennessee, Memphis, TN	
<b>30.2-3: ECG Data Compression Through Adaptive Sampling and Arithmetic Coding</b>	<b>0451</b>
G. Liliana, M. Fernando, P. Gianfranco, Grupo de Bioing. y Biofisica apl., Univ. Simon Bolivar, Caracas, Venezuela	
<b>30.2-4: EMG Amplitude Estimation from Temporally Whitened, Spatially Uncorrelated Multiple Channel EMG</b>	<b>0453</b>
E. A. Clancy and N. Hogan, Dept. of Electrical Eng. and Comp. Science, *Dept. of Mechanical Eng., Massachusetts Institute of Technology, Cambridge, MA	
<b>30.2-5: Compound Digital Filtering of the Magnetomyogram</b>	<b>0455</b>
N. P. Nantel, L. D. Pengelly, Dept. of Computer and Electrical Eng., MacMaster Univ., Hamilton, Ontario, Canada	
<b>30.2-6: Portable Device for Continuous Measurement of Oxygen Uptake</b>	<b>0457</b>
Takanao Higuchi, Toshiyo Tamura*, and Tatsuo Togawa*, Dept. of Mechanical Engr., School of Science and Engr., Waseda Univ., Tokyo, Japan, *Inst. for Medical & Dental Engr., Tokyo Medical & Dental Univ.	
<b>30.3-1: The Analysis of Nonstationary Doppler Spectrum Using a Modified Wigner Distribution</b>	<b>0460</b>
Harry Oung, J.M. Reid, Biomedical Engineering and Science Institute, Drexel University, Philadelphia, PA	
<b>30.3-2: Digital Image Recognition of Brain Capillaries for Morphometric Analysis</b>	<b>0462</b>
J.A. Goyette, G.D. Lapid**, Depts. of Elect. Eng., Neurology*, and Biomedical Engineering**, Northwestern University, Evanston Hospital, Evanston, IL	



<b>30.3-3: A Flow-Compartmental Model to Measure Glucose Transport and Insulin Control Upon It in the Human Skeletal Muscle</b>	<b>0464</b>
Maria Pia Saccomani, Claudio Cobelli, Department of Electronics and Informatics, Padova, Italy	
<b>30.3-4: Rapid Response Thermistors to Measure Ventricular Ejection Fraction: In Vitro Validation</b>	<b>0466</b>
R. Mukherjee, F.G. Spinale*, A.F. von Recum, F.A. Crawford* Dept. of Biocengin., Clemson Univ., Clemson, SC, *Div. of Cardiothoracic Surgery, Medical Univ. of SC, Charleston, SC	
<b>30.3-5: Relaxation Labeling Using Non-Linear Polya Processes</b>	<b>0468</b>
P. Adiseshan**, T.L. Faber** *Graduate Program in Biomed. Eng., **Radiology Imaging Center, The Univ. of Texas Southwestern Medical Center at Dallas, Dallas, Texas	
<b>30.3-6: K-Edge Filtration in Dual-Energy, Single-Exposure Chest Radiography</b>	<b>0470</b>
J.T. Ho, D.L. Parker, Medical Imaging Research Laboratory, Radiology Department, Univ. of Utah School of Medicine, Salt Lake City, Utah	
<b>30.3-7: Feedback Control of Multi-Drug Anaesthesia Using Quantitative and Qualitative Measurements</b>	<b>0472</b>
G. R. Worship, and P. J. Gawthrop, Control Group, Dept. of Mechanical Eng., The University, Glasgow, UK	

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