

**Proceedings of the
Thirteenth Annual
Northeast Bioengineering
Conference**

Volume 1

1987

Proceedings of the Thirteenth Annual Northeast Bioengineering Conference

March 12-13 1987
University of Pennsylvania
Philadelphia, PA

Editor:
Kenneth R. Foster, Ph.D., P.E.

Copyright © 1987 Institute of Electrical and Electronics Engineers, Inc.

IEEE Catalog Number 87-CH2436-4

Library of Congress Catalog Card Number: 87-80502

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limits of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 21 Congress St., Salem, MA 01970. Instructors are permitted to photocopy isolated articles for noncommercial classroom use without fee. For other copying, reprint or republication permission, write to: Director, Publishing Services, IEEE, 345 E. 47 St., New York, NY 10017. All rights reserved. Copyright © 1987 by The Institute of Electrical and Electronics Engineers, Inc.

Printed in the United States of America

Proceedings of the Thirteenth Annual Northeast Bioengineering Conference

Conference Committee

Kenneth R. Foster (Chair)
Banu Onaral
Dennis A. Silage

Program Committee

Frederick Anderson
Nihat M. Bilgutay
Daniel K. Bogen
Gershon Buchsbaum
Roy Davis
Hank S. Eden
Roger P. Gaumond
Leonid Hrebien

Peter A. Lewin
John K. Li
William J. Ohley
Banu Onaral
Robert Schmukler
Dennis A. Silage
Frank S. Waterman

Steering Committee

Joseph D. Bronzino
James S. Duncan
Roger P. Gaumond
Glen C. Gerhard
Walter S. Kuklinski

John LaCourse
William J. Ohley
Stelios C. Orphanoudakis
John W. Strohhenn

Sponsors of the 1987 Conference

Drexel University
IEEE Engineering in Medicine and Biology Society
University of Pennsylvania

Major Financial Support

Office of Naval Research
Whitaker Foundation
University of Pennsylvania
Drexel University

Industrial Contributors

Metrasystems, Inc. (Distributors of TEAC Instruments)
Sun Microsystems

Special Thanks To

David B. Dobson and Leroy Kingman of McGregor-Werner, Inc
Stephen E. Dubin of Drexel University
Mitchell Collier and Frank Sparacino of Information Ventures, Inc.

Preface

The Thirteenth Northeast Bioengineering Conference was held on March 12-13, 1987 on the University of Pennsylvania campus in Philadelphia. The Conference was jointly sponsored by Drexel University and the University of Pennsylvania, and by the IEEE Engineering in Medicine and Biology Society.

By all standards the Conference was an outstanding success. The technical program consisted of nearly 250 scientific papers, organized into 36 platform and one poster session. Special features included symposia on fractals and bioengineering, interactions of electromagnetic fields and biological systems, and aerospace bioengineering. Plenary papers were presented by Henry Eden (bioengineering at the NIH), Gabor Herman (medical imaging), John Reid (medical ultrasound), Willis Tompkins (medical instrumentation), and Oleh Tretiak (imaging processing). A reception and banquet were held at the Egyptian Room of the University Museum, followed by the talk "Animating the Human Figure" by Norman Badler.

We thank the Office of Naval Research and the Whitaker Foundation for their major financial support, and Metrasystems and Sun Microsystems for their exhibits and contributions. Special thanks are due to members of the Program Committee for their efforts on behalf of the Conference. Finally, we thank the many participants, whose enthusiastic contributions made the whole Conference worthwhile.

Kenneth R. Foster

Editor and Conference Chair

**ROSTER OF THE
NORTHEAST BIOENGINEERING CONFERENCES**

<u>CONFERENCE</u>	<u>YEAR</u>	<u>LOCATION</u>
First	1973	University of Vermont
Second	1974	Worcester Polytechnic Institute
Third	1975	Tufts University
Fourth	1976	Yale University
Fifth	1977	University of New Hampshire
Sixth	1978	University of Rhode Island
Seventh	1979	Rensselaer Polytechnic Institute
Eighth	1980	Massachusetts Institute of Technology
Ninth	1981	Rutgers University
Tenth	1982	Dartmouth College
Eleventh	1985	Worcester Polytechnic Institute
Twelfth	1986	Yale University
Thirteenth	1987	University of Pennsylvania

Future Meetings

Fourteenth	1988	University of New Hampshire
Fifteenth	1989	Northeastern University

VOLUME 1

PLENARY SESSION I THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-1
8:20 Welcome

8:30 PL-1 Three-Dimensional Imaging in Medicine 1
G.T. Herman, Radiology, Hosp. of the Univ. of PA

9:00 PL-2 Micro-based Biomedical Image Processing
Workstations
O.J. Tretiak, Elect. & Comp. Eng., Drexel Univ.

9:30 PL-3 Engineering in Ultrasound Diagnosis
J.M. Reid, Biomed. Eng. & Sci. Inst., Drexel Univ.

PLENARY SESSION II FRIDAY AM

DAVID RITTENHOUSE LABORATORY A-1

8:30 PL-4 Evolution of Intelligent Biomedical
Instrumentation
W.J. Tompkins, Elect. & Comp. Eng., Univ. of WI

9:00 PL-5 Bioengineering at the NIH
H. Eden, BEIB, NIH

BANQUET TALK THURSDAY PM

EGYPTIAN ROOM, UNIVERSITY MUSEUM

Animating the Human Figure
N.I. Badler, Comp. & Inf. Sci., Univ. of PA

SESSION 1 THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-1

FRACTAL FORUM

CHAIR: B. Onaral
Elect. & Comp. Eng., Drexel Univ.

10:30 1.1 Introduction to Fractal Concepts in
Physics and Biology
H.E. Stanley, Depts. of Physiology and Physics,
Boston Univ. (GUEST SPEAKER)

11:10 1.2 The Correlation Dimension of Biomedical
Signals
P.E. Rapp, Physiology & Biochemistry, Medical
College of PA

11:20 1.3 Determination of Fractal Dimension: An
Estimation Approach
W.J. Ohley, Dept. of Elect. Eng., Univ. of RI

11:30 1.4 The Kinetics of Ion Channels in a Cell
Membrane are Fractal
L.S. Liebovitch, Dept. of Ophthalmology, Columbia
Coll. of Physicians and Surgeons

11:40 Open Discussion

SESSION 2 THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-2

IMAGING I

CHAIR: E. W. Hansen
Thayer School of Engineering, Dartmouth
Coll.

10:30 2.1 Image Improvement in Emission 5
Computerized Tomography, Based on
Fourier Analysis of the Projection
Data

P.R. Edholm, Diagnostic Radiology, Univ. of
Linköping, Sweden;
R.M. Lewitt, W. Xia

10:45 2.2 Restoring Image Quality in the 9
Polarizing Microscope: Analysis of
the AVEC Method

J.A. Conchello, Thayer School of Engineering,
Dartmouth College;
E.W. Hansen, R.D. Allen

11:00 2.3 An Approach to Image Reconstruction 13
Using Cubic Spline Functions: Its
Significance and Applications

W.K. Cheung, Dept. of Radiology, Hospital of the
Univ. of PA;
G.T. Herman, A. Markoe

11:15 2.4 Restoration of Emission CT Images 16
R.M. Rangayyan, Electrical Engineering, Univ. of
Calgary, Canada;
T.C. Hon

11:30 2.5 A Hybrid Image Reconstruction Technique 19
G. Binge, Dept. of Biomed. Eng., Rutgers Univ.;
E. Micheli-Tzanakou

11:45 2.6 Technical Aspects of Measuring Blood PO₂
Using MRI of Fluorocarbons
P.N. Joseph, Radiology Department, Univ. of PA;
J. Fishman

SESSION 3 THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-4

BIOMECHANICS I (TISSUE MECHANICS)

CHAIR: D.K. Bogen

Dept. of Biomedical Eng., Univ. of PA

- 10:30 3.1 High Speed Stretching of Active Muscles 23
J.D. Harry, Div. of Applied Sciences, Harvard Univ.;
A.W. Ward, N.C. Hegland, T.A. McMahon
- 10:45 3.2 A New Approach for Describing Soft Tissue Behavior 24
J.D. Humphrey, Mech. Eng. Med. & Physio., Johns Hopkins Univ.;
F.C.P. Yin
- 11:00 3.3 Mechanical Characterization of the Isolated Axon and Associated Electrophysiological Changes 26
J.A. Galbraith, Dept. of Bioengineering, Univ. of PA;
L.E. Thibault, D.R. Matteson, T.A. Gennarelli
- 11:15 3.4 Response of Endothelial Cells to Biaxial Deformation 29
F.K. Winston, Dept. of Bioengineering, Univ. of PA;
L.E. Thibault, S. Gorfien, E.J. Macarak
- 11:30 3.5 Effects of Strain on Transport Through Ion Channels 31
C.M. Hunter, Dept. of Bioengineering, Univ. of PA;
L.E. Thibault, P. Mueller
- 11:45 3.6 A Longitudinal Study of the Mechanical Properties of Healing Incisional Wounds 33
S.P. Richardson, McKay Lab., Ortho. Surg. Res., Univ. of PA;
K.D. Chesmel, M.H. Mikulics, J. Black

SESSION 4 THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-5

MODELING AND SIMULATION

CHAIR: H.S. Eden

Biomed. Eng. & Instrumen. Br., NIH

- 10:30 4.1 A Theory for Regional Myocardial Blood Flow 35
R.S. Chadwick, Biomed Eng & Instr. Br., NIH;
J. Ohayon
- 10:45 4.2 Modeling Dye Uptake by the Vitreous for Quantifying Blood-Retinal Barrier Permeability in Normals and Diabetics 38
P.M. Bungay, Biomed. Eng. & Instr. Br., NIH;
R.F. Bonner, M.S. Roy
- 11:00 4.3 Modeling of Cis-Dichlorodiammine-platinum (II) (DDP) Pharmacokinetics 40
F.G. King, Biomed. Eng. & Instr. Br., NIH;
R.L. Dedrick, F.F. Farris
- 11:15 4.4 Human Performance: Science or Art? 44
G.V. Kondraske, Biomed. Eng., Univ. of TX at Arlington

- 11:30 4.5 A Theory for the In Vitro Bleeding Time 48
P.D. Richardson, Div. of Engineering, Brown Univ.

11:45 4.6 Paper Withdrawn

SESSION 5 THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-6

CARDIOLOGY I (ELECTROCARDIOGRAPHY)

CHAIR: C. L. Nikias

Elect. and Comp. Eng., Northeastern Univ.

- 10:30 5.1 Testing the Performance of Least-Squares Inverse Models for Electrocardiography 52
C.L. Nikias, Electrical & Computer Eng, Northeastern Univ.;
D.H. Brooks, J.H. Siegel
- 10:45 5.2 Automated Analysis of Beagle Electrocardiograms 56
E. Kwatny, Comp. & Info. Sciences, Temple Univ.;
D. Peltzman, D. Detweiler
- 11:00 5.3 The Assessment of Autonomic Cardiac Control Based on Systolic Time Intervals and Spectral Analysis of Heart Rate Variability
M.S. Ward, Dept. of Biomed. Eng., Univ. of Miami;
J. Nagel, P. McCabe, N. Schneiderman
- 11:15 5.4 Averaging The ECG For Late Potentials: Possibilities and Limitations 60
W. Craelius, Dept. of Medicine, SUNY;
M. Restivo, R. Henkin, N. El-Sherif
- 11:30 5.5 Role of Slow Conduction in Cardiac Arrhythmias 63
V. Kowtha, Dept. of Biomed. Eng., Rutgers Univ.;
M. Restivo, J. K-J. Li, N. El-Sherif

SESSION 6 THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-8

INSTRUMENTATION I

CHAIR: R. Gaumond

Dept. of Bioengineering, Penn State Univ.

- 10:30 6.1 Assistive Communicator with Remote Capability 65
D.L. Lizotte, Bioengineering Laboratory, Univ. of NH;
D.V. Shahane, F.C. Hludik, J.R. LaCourse
- 10:45 6.2 Frequency Transforming Stethoscope 68
J.B. Eisenberg, EE & CS Dept., The George Washington Univ.;
M.F. Eisenberg, A.A. Wolf
- 11:00 6.3 Energy Efficient Electromagnetic Stimulator 70
N. Guzelsu, Biomaterials Ctr., UMDNJ;
A.J. Salkind, R. Berg, S. Thaler, X. Shen

11:15 6.4 Development of an Electromagnetic Pump for Vestibular System Research 74
D. France, Dept. of Bioengineering, Penn State University;
R. Gaumond, J. Houck, C. Balaban

11:30 6.5 Microprocessor Controlled Appliance Operator 77
G.T. Jankauskas, Bioengineering Laboratory, Univ. of NH;
F. Hludik, J.R. LaCourse

11:45 6.6 A Telephone Set for the Hearing Impaired 79
A. Elahi, Computer Science, Southern CT State Univ.

12:00 6.7 A Practical System for Obtaining More Accurate Information from ECG and EEG 82
G.M. Benko

SESSION 7 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-1

BIOMATERIALS I

CHAIR: S. R. Pollack
Dept. of Bioengineering, Univ. of PA

1:30 7.1 Collagen Fiber Formation: Effect of Proteoglycans 86
A.K. Garg, UMDNJ;
F.H. Silver

1:45 7.2 Absorption and Permeation Through Polymeric Biomaterials 90
S.D. Bruck, Bruck Associates

2:00 7.3 The Role of Stress Corrosion and Piezoelectricity in the Formation of Root Caries 93
J.O. Grippo, Grippo, Dullea & Smith, P.C.
J.V. Masi

2:15 7.4 Evaluation of the Biocompatibility of Collagen-Based Biomaterials 96
A.S. Chernomorsky, Biomaterials Ctr., UMDNJ;
R.A. Berg, F.H. Silver

2:30 7.5 The Effects of CaCl₂ on Stress Generated Potentials in Bovine Cortical Bone 100
R.M. Kowalchuk, Dept. of Bioengineering, Univ. of PA;
S.R. Pollack

2:45 7.6 A Simple Method for the Study of Calcium Oxalate Mineralization 103
L-T. Chan, Dept. of Neurology, Univ. of Pittsburgh;
A.K. Chen, D. Chu, L. Lee, A. Anderson, S.J. Yao, S.K. Wolfson, Jr.

SESSION 8 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-2

IMAGING II

CHAIR: M. D. Altschuler
Dept. of Radiation Ther., Univ. of PA

1:30 8.1 Digital Simulation of Sonographic Images 106
P.S. LaFollette, Jr., Dept. of Comp. and Info. Sci., Temple Univ.;
M.C. Ziskin

1:45 8.2 3-D Molecular Distribution in Living Cells by Deconvolution of Optical Sections Using Light Microscopy 108
W. Carrington, Dept. of Physiology, Univ. of MA Medical School;
K. Fogarty

2:00 8.3 High Resolution Fully 3-D Mapping of Human Surfaces by a Laser Array Camera 112
K.T. Bae, Dept. of Radiation Ther., Univ. of PA;
M.D. Altschuler

2:15 8.4 Algebraic Determination of Principal Dilations of Shape Change with Application to Cephalometric Studies 116
F-S. Lee, Dept. of Biometry, Medical Univ. of SC;
C.F. Lam, Y-C. Chiang

2:30 8.5 Digital Analysis of Ultrasound Doppler Velocity Waveforms 120
G.L. Cote, Dept of Elect. & Sys. Eng, Univ. of CT;
M.D. Fox

SESSION 9 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-4

BIOMECHANICS II (MOTION ANALYSIS)

CHAIR: S. Tashman
Newington Childrens' Hospital

1:30 9.1 A System for 3-Dimensional Lower-Extremity Joint Rotation Measurement 123
S. Tashman, Newington Children's Hosp.

1:45 9.2 The Effect of Alignment Changes on the Gait Parameters of a Below-Knee Amputee 127
S.K. Stimmel, Dept of Exercise Science, Univ. of MA;
R.O. Andres, K.R. Campbell, L. Ekus

2:00 9.3 *Paper Withdrawn*

2:15 9.4 The Evaluation of Muscle Moments: A Preliminary Report 131
R.B. Davis, III, Eng. & Comp. Sci., Trinity College;
P.R. Morico, P.C. Bradley, S. Tashman

2:30 9.5 The Efficient Calculation of Calibrated Force Platform Data 135
R.L. Martino, Div. of Comp. Res. & Tech., NIH

2:45 9.6 A Suboptimal Control Approach for the
Study of Bipedal Locomotion
V. Yen, Mechanical Engineering, Carnegie-Mellon
Univ.;
M.L. Nagurka

SESSION 10 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-5

SENSORY PHYSIOLOGY I

CHAIR: G. Buchsbaum

Dept. of Bioengineering, Univ. of PA

1:30 10.1 Spatial Parameters of Color Contrast
K.T. Blackwell, Bioengineering, Univ. of PA;
G. Buchsbaum

1:45 10.2 Visual Spatio-Chromatic Mechanisms
Derived From Contrast Sensitivity
Functions
A.M. Rohaly, Dept. of Bioengineering, Univ. of PA;
G. Buchsbaum

2:00 10.3 *Paper Withdrawn*

2:15 10.4 Auditory Biofeedback of Vertical and
Horizontal of Eye Movements
in the Dark
G.K. Hung, Biomedical Engineering, Rutgers Univ.;
C.A. Carley, P. Fang, S.A. Menditto, K. Ciuffreda

2:30 10.5 Physicochemical Properties of Vitreous
Body
B. Lee, Dept. of Bioengineering, Univ. of PA;
M. Litt, G. Buchsbaum, J.E. Grunwald

2:45 10.6 Model of Tonic Accommodation
Following Near Fixation In
Different Refractive Groups
G.K. Hung, Biomedical Engineering, Rutgers Univ.;
J.Z. Wang, P.Y. He, K.J. Ciuffreda, S.K. Fisher

3:00 10.7 Speech/Data Detection Technique Using
ADPCM
K.S. Rafila, Faculty of Engineering, Cairo Univ.,
Egypt
V.R. Dhadesugoor

SESSION 11 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-6

CARDIOLOGY II (ARTERIAL MODELS)

CHAIR: W.J. Ohley

Dept. of Electrical Eng., Univ. of RI

1:30 11.1 The Effect of Viscous Wall Damping on
Arterial Models
A. Chatterjea, Engineering Dept., Indiana Univ/
Purdue Univ. of FW;
J.N. Libii

1:45 11.2 Flow Patterns in a Carotid Bifurcation
Model
D.Y. Fei, Biomedical Eng. Program, Virginia
Commonwealth Univ.;
S.E. Rittgers

138 2:00 11.3 Analysis of the Vascular Unloading
Technique for Blood Pressure
Measurement by Use of a
Circulatory System Model
W.J. Ohley, Dept. of Electrical Eng., Univ. of RI;
J.A. Kim

2:15 11.4 Influence of Vascular State on the
Korotkoff Sound
S.Y. Rabbany, Dept. of Bioengineering, Univ. of PA;
G. Drzewiecki, J. Melbin, A. Noordergraaf

2:30 11.5 Velocity Flow-Field Analysis of Cardiac
Dynamics
G.R. Gindi, Diagnostic Radiology, Yale Univ.;
A.F. Gmitro, D.H. Delorie, Jr.

2:45 11.6 Effective Length of the Arterial
Circulation Determined in the Dog
by Aid of a Model of the Systemic
Input Impedance
R. Burattini, Electronics & Automatica, Univ. of
Ancona, Italy;
S. Di Carlo

SESSION 12 THURSDAY AM

DAVID RITTENHOUSE LABORATORY A-8

INSTRUMENTATION II

CHAIR: J. LaCourse

Elect. & Comp. Eng., Univ. of NH

1:30 12.1 High Frequency Current Pathways During
Electrosurgery (Trans-Urethral
Resection)
S.M. Selikowitz, VA/Dartmouth Med. Ctr.,
J.R. LaCourse
G.C. Gerhard

1:45 12.2 A Low-Cost Fiber-Optic Strain Gage
System for Biological Applications
D.T. George, Bioengineering, Univ. of PA;
D.K. Bogen

2:00 12.3 Microprocessor-Controlled Optical Strain-
Measuring System
K.B. Gupta, Bioengineering, Univ. of PA;
D.K. Bogen

2:15 12.4 A Fiber Optic Eye Position Sensor
D.M. Drouin, Dept. of Elect. Engineer., Univ. of NH;
A.D. Drake

2:30 12.5 *Paper Withdrawn*

2:45 12.6 A Microprocessor Controlled Ocular Pulse
Acquisition System
D.P. Campagna, Elect. and Comp. Eng., Univ. of NH;
A.D. Drake

3:00 12.7 A Fiber Interferometer for Ocular Pulse
Measurement
A.D. Drake, Elect. and Comp. Eng., Univ. N.H;
D.P. Campagna

3:15 12.8 A Force Measuring Apparatus for
Evaluation of Electrosurgical
Waveforms
G.C. Gerhard, Elect. & Comp. Eng., Univ. of NH;
J.R. LaCourse, S.M. Selikowitz

SESSION 13 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-1

BIOMATERIALS II

CHAIR: P. Ducheyne

Dept. of Bioengineering, Univ. of PA

- 3:30 13.1 Initial and Long Term Stability of Titanium Felt
C. Cohen, Dept. of Bioengineering, Univ. of PA;
E. Nazar, P. Ducheyne, J. Cuckler
- 3:45 13.2 Histological Evaluation of Porous Polyethylene Used for Reconstructive Surgery 196
A. Shanbhag, Dept. of Bioengg., Clemson Univ.;
H. Friedman, D.L. Powers, J. Augustine,
B.W. Saurer, A.F. von Recum
- 4:00 13.3 3-Dimensionally Braided Carbon/ Polysulfone Composite for Bone Fixation 198
H.B. Soebroto, Fibrous Mater. Res. Lab., Drexel Univ.;
F.K. Ko
- 4:15 13.4 Acoustic Emission Analysis of Fatigue Phenomena in Ti-6Al-4V Implant Alloy 202
D.H. Kohn, Dept. of Bioengineering, Univ. of PA;
P. Ducheyne, J. Awerbuch
- 4:30 13.5 The Effect of Stress Concentrations on Fatigue Properties of Porous Coated Implants 206
D. Wolfarth, Dept. of Bioengineering, Univ. of PA;
M. Filiaggi, P. Ducheyne
- 4:45 13.6 A Cortex Reinforcing Mesh in Hip Arthroplasty 208
A.M. deBeus, Mech. Eng., Columbia University;
D.A. Hoeltzel, N.S. Eftekhari

SESSION 14 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-2

RADIOLOGY

CHAIR: J.J. McInerney

Dept of Bioengineering, Penn. State Univ.

- 3:30 14.1 On the Fully Discretized Model for the Inverse Problem of Radiation Therapy Treatment Planning 211
Y. Censor, Dept of Radiation Therapy, Univ. of PA, Sch. of Med.;
W.D. Powlis, M.D. Altschuler
- 3:45 14.2 Microdosimetry of 14 MEV Neutrons in Tissues of Different Composition 215
R.E. Wallace, Dept. of Radiation Therapy, Univ. of PA;
P. Bloch
- 4:00 14.3 Enhancement of Radiographic Images by Gradient Operators 219
J.S. DaPonte, Computer Science, So. CT State Univ.;
M.D. Fox

4:15 14.4 Techniques of Evaluation of the Autoradiogram Processing System
D. Lu, Cleveland Clinic Foundation;
S.C. Jones

- 4:30 14.5 Perfusion Characteristics Measured by X-Ray Fluorescence 223
B.M. Palmer, Dept of Bioengineering, Penn. State Univ.;
J.J. McInerney, G.L. Copenhaver, M.D. Herr

SESSION 15 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-4

BIOMECHANICS III (BIOSOLID MECHANICS)

CHAIR: R.B. Davis

Dept. of Eng. & Comp. Sci, Trinity College

- 3:30 15.1 Finite Element Analysis of the Prosthetic Acetabular Region 227
K.R. Reddy, Dept. of Mech. Eng., NJ Inst. Technol.;
M.J. Pappas
- 3:45 15.2 Linear Impact Testing for Evaluation of Bone Fracture Healing 231
M. Moazedi, City College of NY;
R. Schmukler, A. Chiabrera, J.J. Kaufman, A. Sadegh,
B. Liaw, A.A. Pilla
- 4:00 15.3 A Stress Analysis of the Human Femur
D.D. Raftopoulos, Mechanical Engineering, Univ. of Toledo;
W. Qassem
- 4:15 15.4 Delta Tibial External Fixation Frames 234
J. Vossoughi, Sch. of Eng. and Archit., Catholic Univ.;
Y. Youm, A. Poka, A.R. Burgess, R.J. Brumback,
M. Bosse
- 4:30 15.5 Structural Synthesis of Lower Limb Prostheses for Optimal Gait Performance 237
R. Seliktar, Dept. of Mech. Eng., Drexel Univ.
- 4:45 15.6 Viscoelastic Heat Generation in Excised Vocal Fold Tissue 241
F. Alipour, Speech Path. and Audiology, Univ. of IA;
I.R. Titze

SESSION 16 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-5

SENSORY PHYSIOLOGY II

CHAIR: G.K. Hung

Dept. of Biomed. Eng., Rutgers Univ.

- 3:30 16.1 Modeling Post-Saccadic Drift: Dynamic Overshoot May Be Passive 245
H.P. Goldstein, Wills Eye Hospital, Philadelphia
- 3:45 16.2 An Expert System Design for Vigilance State Scoring in the Rat 249
R.A. Morelli, Eng. & Comp. Sci., Trinity College;
J.D. Bronzino

4:00 16.3 Pitch Determination in a Musical Context 252
D.M. Richard, Systems Engineering, Univ. of PA

4:15 16.4 Detection of Vigilance States: 255
Autoregressive Approach
T. Ning, Eng & Comp. Sci., Trinity College;
J.D. Bronzino

4:30 16.5 A Knowledge-Based Approach for
Automatic Recognition of Deaf
Speech
K. Abdelhamied, Fac. of Eng., Cairo Univ., Egypt;
M. Waldron, R. Fox, M. El-Sherif

4:45 16.6 A Three Parameter-Based Approach to the 258
Enhancement of Nonstationary Brainstem
Auditory Evoked Potentials Data
M. Hohenberger, Electrical Eng., Temple Univ.;
J. Schwegler

SESSION 17 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-6

CARDIOLOGY III (ASSIST DEVICES)

CHAIR: S.T. McMillan

Chemical Engineering, Northeastern Univ.

3:30 17.1 In Vitro/In Vivo Velocity and Turbulence 261
Characterization of a Number of Mitral
Heart Valve Prostheses
S.T. McMillan, Chemical Engineering,
Northeastern Univ.;
Y-R. Woo, M. Jones, E.E. Eidbo, A.P. Yoganathan

3:45 17.2 *Paper Withdrawn*

4:00 17.3 Computerized System for the Study of 265
Cardiopulmonary Resuscitation
(CPR) in Man
J. Romlein, Johns Hopkins Univ Sch. of Med;
H.R. Halperin, N. Olsen, J. Downs, H.A. Conner,
J.E. Tsitlik

4:15 17.4 Pulsatile Flow in a Transverse Clip 267
Stenosis
M. Nevin, Mechanical Engineering, Worcester
Poly. Inst.;
B. Savilonis

4:30 17.5 Intraaortic Balloon Pumping and Cardiac 269
Oxygen Balance
O. Barnea, Biomed. Eng. & Sci. Inst., Drexel Univ.;
T.W. Moore, D. Jaron

4:45 17.6 Hemodynamic Consequences of the Trans- 271
Esophageal Cardiac Pacing
C. Jensen, Biomedical Engineering, Rutgers Univ.;
J.K-J. Li

SESSION 18 THURSDAY PM

DAVID RITTENHOUSE LABORATORY A-8

COMPUTERS AND EXPERT SYSTEMS

CHAIR: Michael Boas

Nat'l Biomed. Res. Found.

3:30 18.1 Automatic Chromosome Analysis
R.S. Ledley, Nat'l Biomed. Res. Found.;
H.A. Lubs, M. Buas, T.J. Golab

3:45 18.2 Animation of Human Figure Dynamics 273
P. Lee, Comp. & Inf. Sci., Univ. of PA;
N.I. Badler, J.M. McCarthy

4:00 18.3 Combining Position and Orientation 276
Goals in a Multiple Constraint Based
Articulated Figure Positioning System
G. Walters, Comp. & Inf. Sci., Univ. of PA;
N.I. Badler

4:15 18.4 A Microcomputer-Based Medical Expert 279
System Shell Using a Weight/Threshold
Decision Mechanism
C.W. Starr, Dept. of Biometry, Medical Univ. of SC;
C. Tsai, C.F. Lam

4:30 18.5 System Safety in Medical Computing
M.F. Houston, FDA, Ctr for Devices & Rad. Health

4:45 18.6 Application of Artificial Intelligence
for Modeling of Drugs, Enzymes,
and Receptors
M.N. Liebman, Dept. of Physiology, Mt. Sinai School
of Medicine

5:00 18.7 *Paper Withdrawn*

SESSION 19 FRIDAY AM

DAVID RITTENHOUSE LABORATORY A-1

ULTRASOUND I

(IMAGING AND SIGNAL PROCESSING)

CHAIR: N. Bilgutay

Electrical and Computer Eng. Drexel Univ.

10:00 19.1 Diversity Combining With Examples 282
in Microwave Imagery
B.D. Steinberg, Electrical Engineering, Univ. of PA

10:15 19.2 A Pulse-Echo Ultrasound Tapered Phased 286
Array Transducer
P.J. Benkeser, School Electrical Eng., Georgia Inst.
of Tech.

10:30 19.3 Estimating Spectral Shift of Echo Signal 289
by Maximum Entropy Method
S.I. Kim, Biomed. Eng. & Sci. Inst., Drexel Univ.;
J.M. Reid

10:45 19.4 In-Vivo Tissue Differentiation through 290
Digital Signal Analysis and Pattern
Recognition Algorithms
N. Botros, Dept. of Electrical Eng., Southern
Illinois Univ.

11:00 19.5 B-Mode Ultrasound Imaging and Placement of Endotracheal Tubes
D.T. Raphael, Dept. of Anesthesiology, U. Conn. Health Center;
F.U. Conard, III

11:15 19.6 Resolution in Wideband Backpropagation
T.J. Teo, Biomedical Eng. Sci. Ins., Drexel Univ.;
J.M. Reid

SESSION 20 FRIDAY AM

DAVID RITTENHOUSE LABORATORY A-2

BIOCHEMICAL ENGINEERING

CHAIR: M. Litt

Dept. of Bioengineering, Univ. of PA

10:00 20.1 An Ultrasensitive Miniature Air/Gas Flow Sensor for Medical Applications, Based Upon Novel Semiconductor Technology
H.T. Henderson, Elect. & Computer Eng., Univ. of Cincinnati;
W. Hsieh

10:15 20.2 Pulse Mode Iontophoresis of Insulin - A New Approach to Control Blood Glucose Levels in Diabetic Rats
W.-M. Shi, Dept of Biomed. Eng., Rutgers Univ.;
J.K.-J. Li, L.C. Liu, Y. Sun, O. Siddiqui, Y.W. Chien

10:30 20.3 Degradation Analysis of Polylactic Acid (PLA)-Glass Fiber Composites
S.R. Jenei, Biology Department, Univ. of Dayton;
P.K. Bajpai, T.D. Guastavino

10:45 20.4 Electrochemical Evaluation of Various Membrane Reconstitution Techniques
F.T. Hong, Physiol., Wayne State Univ. Sch. of Med.

11:00 20.5 Rheology of Cervical Mucus in Cystic Fibrosis
R.J. Kelemen, Bioengineering, Univ. of PA;
D. Holsclaw, M. Litt

SESSION 21 FRIDAY AM

DAVID RITTENHOUSE LABORATORY A-2

AEROSPACE BIOENGINEERING

CHAIR: L. Hrebien

Naval Air Development Center

10:00 21.1 Applications of Biomedical Engineering to the Aircraft Industry
J.M. Foley, McDonnell Douglas Co.

10:15 21.2 Design Specifications for an Anatomically Based Anthropometrically Representative Head Form
G.D. Frisch, Naval Air Development Center

10:30 21.3 Using Arterial Pulse Wave Delay to Assess +Gz Protection
J.P. Cammarota, Naval Air Development Center
L. Hrebien

294 10:45 21.4 An Improved Controller for a Pulsating Anti-G Suit 313

B.R.S. Reddy, Biomed. Eng. and Sci. Inst., Drexel Univ.;
T.W. Moore, F. Kepics, L. Hrebien, D. Jaron

11:00 21.5 Endpoint Determination During -Gz Acceleration Stress in Humans 316
P.E. Whitley, Naval Air Development Center

11:15 21.6 Extended Cardiovascular Model to Study G Stress Effects 320

J. Bai, Biomed. Eng. & Sci. Inst., Drexel Univ.;
T.W. Moore, D. Jaron

SESSION 22 FRIDAY AM

DAVID RITTENHOUSE LABORATORY A-5

BIOELECTRIC PHENOMENA I

CHAIR: R. Schmukler

Mt. Sinai Hospital

10:00 22.1 Mechanisms of Electroporation and Electrolysis of Cells
T.Y. Tsong, Biological Chemistry, Johns Hopkins Univ.

10:30 22.2 The Desickling of Sickled Erythrocytes by Means of Low Intensity, Low Frequency Electric Fields: A Finite Element Analysis. I. Surface Force Density Calculation
J.W. Ashe, Dept. of Bioengineering, Univ. of PA;
S. Takashima, D. Bogen, T. Asakura

10:45 22.3 Changes in Interaction Between Biomembrane Molecules Due to Externally Applied Electromagnetic Fields 326
J.D. Bond, The Bond Group
N.C. Wyeth

11:00 22.4 A Characterization of Metal Bioelectrodes Using the Fractal System Model 328
Y.Y. Tsao, Bioelectrode Research Lab, Drexel Univ.;
B. Onaral, H.H. Sun

11:15 22.5 Patch Clamp: Currents through Single Ion Channels and a Fractal Interpretation of Their Kinetics 331
L.S. Liebovitch, Ophthalmology, Columbia Univ.

VOLUME 2

SESSION 23 FRIDAY AM

DAVID RITTENHOUSE LABORATORY A-6

CARDIOLOGY IV (CARDIAC MECHANICS)

CHAIR: A. Noordergraaf

Dept. of Biomed. Eng., Univ. of PA

309 10:00 23.1 Energy Balance Model of Ventricular Contraction
P.K. Porter, Dept. of Bioengineering, Univ. of PA;
J.L. Palladino, J. Melbin, A. Noordergraaf

10:15 23.2 Experimental Evaluation of a Model for the Origin of the Third Heart Sound
M.J. Wasicko, Dept. of Biomedical Eng., Rutgers Univ.;
G. Drzewiecki, J.K.-J. Li

10:30 23.3 Mechanics of the Left Ventricle: Effects of Radial Activation and Twisting Motion
J. Ohayon, Biomed Eng & Instr Branch, NIH;
R.S. Chadwick

10:45 23.4 Regurgitation in an Evad: Performance Effect and Modeling
J. Tirinato, Bioengineering Program, Penn. State Univ.;
W. Woods, U. Tsach, D. Geselowitz, H.-K. Hsu

11:00 23.5 Weightlessness as a Cardiac Emergency Assist Device
N.M. Murali, Department of Electronics, Osmania Univ., INDIA

SESSION 24 FRIDAY AM

DAVID RITTENHOUSE LABORATORY A-8

BIOLOGICAL SIGNAL PROCESSING I (GASTROINTESTINAL ELECTROPHYSIOLOGY)

CHAIR: W. Chey

Genesee Hospital (Rochester NY)

10:00 24.1 Electrical Activity of the Gut: Fundamental Information for Evaluation of GI Modal Function
W. Chey, Genesee Hospital (Rochester)

10:30 24.2 Time and Frequency Domain Analyses of the Surface and Serosal Recordings of Electrogastrograms in Dogs
M. Tanyel, Biomed. Eng. & Sci. Inst., Drexel Univ.;
C.V.K.P. Rao, W.Y. Chey, K.Y. Lee, B. Onaral, H.H. Sun

10:45 24.3 Automated Analysis of Gastric Emptying: Geometrical Properties
R. Ech, Electrical Engineering, Temple Univ.;
Z. Delalic, A. Abutaleb

11:00 24.4 *Paper Withdrawn*

11:15 24.5 Modern Spectrum Analysis of Antral Motility
T. Janssen, Elect. Eng. & Dia. Imag., Temple University;
J. Higgins, M. Schmidt, F. McCafferty, J. Siegel, A. Abutaleb

SESSION 25 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-1

ULTRASOUND II (DOPPLER EFFECT)

CHAIR: P.M. Shankar

Drexel Univ.

1:30 25.1 Acoustical Doppler Effect Analysis - Is it a Valid Method?
D. Censor, Electrical & Com. Eng., Drexel Univ.

333 1:45 25.2 Doppler Ultrasound in Fluid Flow Analysis
D.G. Shombert, Ctr. for Devices & Rad. Hlth.;
R.F. Carey, B.A. Herman, T.W. Pape

2:00 25.3 True Volume Flow Measurement with Multibeam Ultrasound Doppler
M.D. Fox, Electrical & Systems Eng., Univ. of CT

2:15 25.4 Comparison of Two Pulsed Doppler Techniques for Measuring Pulmonary Velocity Profile
B. Ha, UNC School of Medicine;
C. Lucas, G.W. Henry, J. Ferreiro, B.A. Keagy, B.R. Wilcox

2:30 25.5 Doppler Blood Flow Studies of Breast Tissue at Normal and Reduced Ambient Pressures
V.P. Abraham, Biomed. Eng. & Science, Drexel Univ.;
P.C. Pedersen, F.W. West, J.M. Reid

SESSION 26 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-2

BIOMECHANICS IV (RESPIRATORY MECHANICS)

CHAIR: P.W. Scherer

Dept. of Bioengineering, Univ. of PA

1:30 26.1 *Paper Withdrawn*

1:45 26.2 Redistribution of Pulmonary Ventilation During High-Frequency Ventilation (HFV)
B.A. Simon, Dept. of Envir. Physiol., The Johns Hopkins Univ.;
W. Mitzner

2:00 26.3 A Fluid Mechanical Analysis of Esophageal Transport
J.G. Brasseur, Dept. of Mech. Eng., Clemson Univ.

2:15 26.4 The Relationship between the Airway Pressure and Alveolar Pressure: Unsteady and Viscous Effects
F. Moslehi, Dept. of Anesthesiology, Univ. of CT Medical Sch.;
J.R. Ligas, M.A.F. Epstein

2:30 26.5 Mathematical Modeling of Mucociliary Clearance in the Human Tracheobronchial Region
J.-P. Hu, Mechanical Engineering, Manhattan College

2:45 26.6 Convective Exchange in High Frequency Jet Ventilation
W.J. Muller, Dept. of Bioengineering, Univ. of PA;
P.W. Scherer

3:00 26.7 An Automated Method for Determining Time Constants of Forced Expiratory Maneuver
K. Satyanarayana, Dept of Elect. & Comp. Eng., Osmania Univ., India
D.C. Reddy

SESSION 27 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-4

HYPERTHERMIA

CHAIR: F. Waterman
Dept. of Rad. Therapy,
Thomas Jefferson Univ.

- 1:30 27.1 pH Distribution in Human Tumors and Effect of Glucose Administration
D.B. Leeper, Radiation Therapy, Thomas Jefferson Univ. Hosp.;
A.T. Thistlethwaite, G.A. Alexander, L. Tupchong
- 1:45 27.2 Determination of Blood Flow in Human Tumors During Local Hyperthermia
F.M. Waterman, Dept. of Rad. Ther., Thomas Jefferson Univ.;
R.E. Nerlinger, J. Matthews, L.T. Tupchong 384
- 2:00 27.3 An Investigation of Three Potential Errors that Can Occur in Common Experimental SAR Measurements
K.M. Jones, Thayer School of Engg., Dartmouth College;
T.P. Ryan, J.W. Strohbehn 386
- 2:15 27.4 SAR Evaluation of Interstitial Clinical Heating for Biliary Obstruction Due to Cancer
T. Ryan, Thayer School of Engg., Dartmouth College;
C.T. Coughlin, J.W. Strohbehn 390
- 2:30 27.5 Interstitial Microwave Hyperthermia Combined with Iridium-192 Implants for the Treatment of Recurrent Brain Malignancies
A. Winter, Dept. of Neurosurgery, The Hospital Center at Orange;
T. Borok, J. Laing, R. Paglione, F. Sterzer, I. Sinclair, J. Plafker 394
- 2:45 27.6 An Amputated Human Leg as a Realistic Phantom for Hyperthermia
C.K. Charny, Biomed. Eng. & Instr. Br., NIH;
J.L. Guerquin-Kern, H. Coldefy, R.L. Levin 399

SESSION 28 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-5

BIOELECTRIC PHENOMENA II

CHAIR: H.P. Schwan
Dept. of Bioengineering, Univ. of PA

- 1:30 28.1 Local Transepithelial Current Measurements by Vibrating Probe
C. Scheffey, Molecular Neurobiology, Yale Univ. School of Medicine 403
- 2:00 28.2 Changes in the Dielectric Relaxations of Chondroitin Sulfate C Induced by Bacterial Endotoxin
S.R. Vulimiri, Biomed. Eng. & Sci. Inst., Drexel Univ.;
R.B. Beard 407

- 2:15 28.3 Bioelectric Forces Involved in Cell Division
A.A. Wolf, The George Washington Univ. 410
- 2:30 28.4 Low Level Microwaves Affect Gene Expression
J.D. Saffer, Jackson Laboratory 414

SESSION 29 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-6

INSTRUMENTATION III (NONINVASIVE MEASUREMENTS)

CHAIR: F. Anderson
University of MA School of Medicine

- 1:30 29.1 Impedance Cardiography - Coming of Age
F.K. Lee, Episcopal Hosp.;
J.M. Van De Water, H.H. Sun 418
- 1:45 29.2 Rheoencephalography: The Jury is Still Out!
B. Shender, Biomed. Eng. & Sci. Inst., Drexel Univ.;
S. Dubin, L. Hrebien, O. Barnea, F. Kepics 422
- 2:00 29.3 Viscoelastic Properties of Thoracic Aorta
M.G. Sharma, Eng. Science and Mech., Penn. State Univ. 426
- 2:15 29.4 Comparison of Methods for the Determination of Aortic Compliance
T. Cui, Biomedical Engineering, Rutgers Univ.;
J.K.-J. Li, G. Drzewiecki 429
- 2:30 29.5 Development of a Noninvasive Method for Measuring Arterial Compliance
J.A. Nugent, Dept of Surgery, Univ. of MA Medical Ctr;
F.A. Anderson, Jr., F.M. Bennett, H.B. Wheeler 431
- 2:45 29.6 The Use of Ultrasound Imaging in the In Vivo Determination of Normal Human Arterial Compliance
L.I. Stratouly, Dept. of Surgery, Univ. of MA Med. Ctr.;
P.A. Cardullo, F.A. Anderson, Jr., W.W. Durgin, H.B. Wheeler 435

SESSION 30 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-8

BIOLOGICAL SIGNAL PROCESSING II (DIGITAL TECHNIQUES)

CHAIR: D.A. Silage
Dept. of Electrical Engineering,
Temple University

- 1:30 30.1 Time Differentiation of Endocardial Signals by Five-Point Parabolic Interpolation
E.G. Walsh, Biomed. Eng. Program, Worcester Poly. Inst.;
R.A. Peura 438
- 1:45 30.2 Fast Pilot Blackout Predetection Using Suboptimal Filters
E.A. Trachtenberg, ECE Dept., Drexel Univ.;
A.H. Choudhary 442

2:00 30.3 Mass Spectrometer Frequency Response Compensation Using a Matched FIR Filter 446
R. Dzwonczyk, Anesthesiology, Ohio State Univ. Hospital;
E. Nunziata, B. Ezzeddine

2:15 30.4 A Trainable Model for Near Periodic Signals 449
L. Wolf, Biomed. Eng. & Sci. Inst., Drexel Univ.;
D. Jaron, T. Moore

2:30 30.5 Modified Chirp-z Spectrum Compression for the Hearing Impaired 452
L.D. Paarmann, Dept. Elec. & Comp. Eng., Drexel Univ.

2:45 30.6 Bit Serial Digital Signal Processor in the Spectral Analysis of Ventilation 456
D.A. Silage, Dept. of Electrical Eng., Temple Univ.

3:00 30.7 Spectral Analysis of Heart Rate and Respiratory Patterns in Infants with Apnea 459
S.T. Nugent, Dept. of Engineering, Dalhousie Univ., Canada;
J.P. Finley

SESSION 31 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-1

ULTRASOUND III

(ULTRASOUND TRANSDUCERS AND FIELD PARAMETERS)

CHAIR: P.A. Lewin

Elect. & Comp. Eng., Drexel Univ.

3:30 31.1 Ultrasonic Tissue Characterization in Breast Biopsy Specimens 462
P.D. Edmonds, Bioengineering Research, SRI International;
C.L. Mortensen, S.K. Holland

3:45 31.2 Thermal Model for Ultrasound Ablation and Hyperthermia 464
M. Ostromogilsky, Riverside Research Institute;
B. Lunzer, F.L. Lizzi, J. Driller, A. Rosado, M. Rondeau

4:00 31.3 On the Problems Associated with Focused Transducers in Ultrasonic Attenuation Measurements 467
Y.W. Yuan, Bioengineering, Penn State Univ.;
K.K. Shung, W.D. Dreschel

4:15 31.4 Performance Specifications for Piezopolymer Ultrasound Hydrophones 470
G.R. Harris, Ctr. for Devices and Radiological Health

4:30 31.5 The Influence of an Insonation Vessel on Ultrasound Exposimetry 474
S.B. Barnett, Ultrasonic Inst., Australia;
G. Kossoff

4:45 31.6 A Computerized Acoustic Output Acquisition System 477
M.T. Poczobutt, Elect. & Comp. Eng., Drexel Univ.;
P.A. Lewin, M.E. Schafer

5:00 31.7 Ultrasonic Enhancement of Membrane Permeation of Acetylsalicylic Acid 480
T.M. Alward, Electrical & Systems Eng., Univ. of CT;
D.J. Fournier, M.D. Fox

SESSION 32 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-2

BIOMECHANICS V

(REHABILITATION BIOMECHANICS)

CHAIR: D.G. Wilder

Orthop., Univ. of VT

3:30 32.1 Cervical Quadriplegia Resulting from Axial Loading Injuries: Cinematographic, Radiographic, Kinetic, and Pathologic Analysis

J.S. Torg, Sports Medicine Center, Univ. of PA;
J.J. Vegso, A. Yu

3:45 32.2 Tomographic Atlas of Thigh Muscle in Persons with Spinal Cord Injury 484
C.J. Robinson, Rehab R&D Ctr, Hines VA Hosp.;
J. Bolam, M. Chinoy, M. Vacek, N. Kett

4:00 32.3 A Comparison of Postural Responses Used by Young and Elderly Females 486
S.M. Hemeon-Heyer, Dept of Exercise Science, Univ. of MA;
R.O. Andres

4:15 32.4 Sudden, Unstable Rotation Responses to an Overload in the Lumbar Spine 490
D.G. Wilder, Orthop. and Rehab., Univ. of VT;
M.H. Pope, R.E. Seroussi, J. Dimnet

4:30 32.5 The Spinal Engine and Its Gearbox 492
S. Gracovetsky, Diagnospine Research Inc.;
A. Carbone

SESSION 33 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-4

BIOHEAT TRANSPORT

CHAIR: H. Arkin

Vet. Biosciences, Univ. of IL

3:30 33.1 Local and Whole Body Thermal Effects of Regional Hyperthermia as Predicted by a Whole Body Thermal Model of Man 494
C.K. Charny, Biomed. Eng. & Instr. Br., NIH;
R.L. Levin

3:45 33.2 Multiple Arrays of Thermal Sensors for the Distinction Between the Perfusive and the Convective Modalities of Heat Transfer in Living Tissues 499
H. Arkin, Vet. Biosciences, Univ. of IL;
K.R. Holmes, M.M. Chen

4:00 33.3 Paper Withdrawn

4:15 33.4 An Uncovered Reflecting and Absorbing Surface Thermopile Type Radiometer 503
X-H. Su, J.B. Pierce Foundation;
L. Berglund

- 4:30 33.5 Absorbed Solar Radiation from Measured Sweat Rate 507
L. Berglund, J.B. Pierce Foundation
D. Fashena, X-H. Su, A. Gwodsdow
- 4:45 33.6 *Paper Withdrawn*
- 5:00 33.7 *Paper Withdrawn*
- 4:00 35.3 The Use of X-Ray Scatter Fields to Detect Impaired Mechanical Function of the Heart After Embolization 533
J.J. McInerney, Dept. of Biomed. Eng., Penn State Univ.;
M.D. Herr, G.L. Copenhagen, D.L. Morris
- 4:15 35.4 Acoustical Noninvasive Diagnosis of Coronary Artery Disease 537
M.T. Ortiz, Rutgers Univ.;
J.L. Semmlow, J.B. Kostis, W. Welkowitz, J.W. MacKenzie
- 4:30 35.5 Automated Cardiac Mapping System 541
V.R. Vassallo, Biomedical Eng. Program, Worcester Poly. Inst.;
J.A. Pappalardo, J.J. Shea, R.A. Peura, G.E. Beatty, M.F. Whelan

SESSION 34 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-5

BIOELECTRIC PHENOMENA III

CHAIR: C. Grosse
Dept. of Physics, Univ. Nac.
Tucuman, Argentina

- 3:30 34.1 Electro-Rotation: The Context With Respect To Other Ponderomotive Effects 511
H.P. Schwan, Dept. of Bioengineering, Univ. of PA
- 4:00 34.2 Electro-Rotation: Experimental Methods and Results 514
W.M. Arnold, Dept. of Biotechnology, Univ. of Wurzburg;
U. Zimmermann
- 4:15 34.3 Low Frequency Relaxation of Suspensions of Charged Particles in Electrolyte Solution
C. Grosse, Dept. of Physics, Univ. Nac. Tucuman, Argentina;
K.R. Foster
- 4:30 34.4 Real Time Impedance Measurements of Living Cells 518
R. Schmukler, Dept. of Orthopaedics, Mt. Sinai School of Medicine;
J.J. Kaufman, A.A. Pilla
- 4:45 34.5 Methods for Studying the Microwave Absorption Characteristics of Biological Materials 522
C.C. Davis, Electrical Eng. Dept., Univ. of MD;
C-S. Lee

SESSION 35 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-6

CARDIOLOGY V (IMAGING)

CHAIR: R. Peura
Dept. of Biomed. Eng., Worcester Poly. Inst.

- 3:30 35.1 An X-Ray Flying Spot Scanning System for Non-Invasive Cardiac Surface Imaging 526
M.D. Herr, Div. of Bioengineering, Penn State Univ.;
J.J. McInerney
- 3:45 35.2 Noninvasive Measurement of Rabbit Aortic Wall Thickness Using Ultrasound and Histological Analysis 530
C.M. Buntin, Biomaterials Center, UMDNJ;
F.H. Silver

SESSION 36 FRIDAY PM

DAVID RITTENHOUSE LABORATORY A-8

BIOLOGICAL SIGNAL PROCESSING III (BRAIN ELECTRICAL ACTIVITY)

CHAIR: T. Bashore
Medical College of PA

- 3:30 36.1 Functional Brain Topography
R.N. Harner, Medical College of PA
- 4:00 36.2 EEG and Evoked Potential Monitoring: An Industry Perspective 545
R. Moberg, Interspec, Inc.
- 4:15 36.3 Analysis of Visual Evoked Responses in the Frequency Domain by the Method of Moments 549
E.B. Moody, Dept. of Biomed. Eng., Rutgers Univ.;
E. Micheli-Tzanakou, S. Chokroverty
- 4:30 36.4 Topographic Mapping of Sensory Evoked Potentials: Prospects and Pitfalls
G. Goldberg, Moss Rehab. Hosp.
- 4:45 36.5 A Finite-Element Model of the Head
A.C. Bliton, Bioengineering Program, Penn State Univ.;
R.P. Gaumond