The Fourth Biot Conference
on
Poromechanics

Including the Second Frank L. DiMaggio Symposium

Prof. Maurice Anthony Biot, a world renowned engineer, physicist, and applied mathematician, was a professor of mechanics at Columbia University in the period 1937-1945

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Conference Site

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ERG Construction Trade and Industry Co. Inc., Ankara, Turkey
Poromechanics Institute, University of Oklahoma
ASCE Engineering Mechanics Institute
ADAMA Engineering, Newark, DE, USA

June 7, 2009 (Sunday)

15:00-17:30: Registration

June 8, 2009 (Monday)

7:30-8:30	Registration			
8:00-8:30	Breakfast			
8:30-9:00	Opening Ceremony Welcome speech by Dean Gerald Navratil			
9:00-9:45	Plenary Lecture (Biot Lecture, Prof. Zdenek Bazant) *Roone Arledge Cinema*			
9:45-10:00	Coffee Break			
	Room 555	*Room 477*	*Room 569*	*Satow Room*
10:00-12:30	Cowin [Cowin]	Yin	Gutierrez (I)	Kaliakin (I)
12:30-13:30	Lunch Break			
13:30-15:45	Muralee/Younen (I) [Suo]	Zimmerman/ Waisman	Sahay (I)	Xu (I)
15:45-16:00	Coffee Break			
16:00-18:15	Sahay (II) [Harris]	Zeghal (I)	Muralee/Younen (II)	Kaliakin (II)
18:00-18:20	Departure by bus in front of Lerner Hall			
19:00-21:30	Cruise (with Dr. Bojidar Yanev, Executive Director, Bureau of Bridges, New York City)			

[ ]: Keynote Lecture

June 9, 2009 (Tuesday)

8:00-8:30	Registration/Breakfast			
8:30-9:15	Plenary Lecture (Mindlin Lecture, Prof. James Rice) *Roone Arledge Cinema*			
9:15-9:45	Coffee Break			
	Room 555	*Room 477*	*Room 569*	*Satow Room*
9:45-12:00	Bobko (I) [Ulm]	Ferronato/Gambolati	Muralee/Younen (III)	Lu (I)
12:00-13:00	Lunch Break			
13:00-15:15	Gutierrez (II) [Borja]	Zeghal (II)	Sahay (III)	Manzari
15:15-15:45	Coffee Break			
15:45-18:00	Berryman [Sorek]	Bobko (II)	Muralee/Younen (IV)	Lu (II)
19:00-21:30	Banquet Dinner (Low Memorial Library)			

June 10, 2009 (Wednesday)

8:00-8:30	Registration/Breakfast			
8:30-9:15	Plenary Lecture (Burmister Lecture, Prof. Fumio Tatsuoka) *Roone Arledge Cinema*			
9:15-9:45	Coffee Break			
	Room 555	*Room 477*	*Room 569*	*Satow Room*
9:45-12:00	Lu (III)	Xu (II)	Gutierrez (III)	Huyghe

WHO'S WHO


Part of Columbia CEEM Faculty (From Left): Hoe I. Ling, Christian Meyer, Patricia J. Culligan, Raimondo Betti, Rene B. Testa, Haim Waisman, Andrew Smyth, Huiming Yin, George Deodatis

Session Chairs and Staff

Frank DiMaggio, Younane Abousleiman, Alex Cheng

Stephen C. Cowin

Jacques M. Huyghe

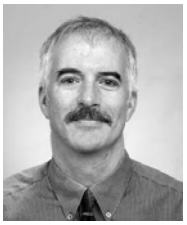
Massimiliano Ferronato

Marte Gutierrez

Ning Lu

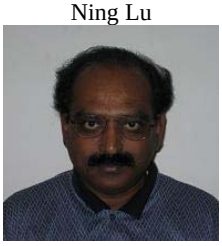
Mourad Zeghal

X. Frank Xu



Robert W. Zimmerman

James G. Berryman



Pratap Sahay

Christopher Bobko

Kanthasamy Muraleetharan

Victor N. Kaliakin

Majid T. Manzari

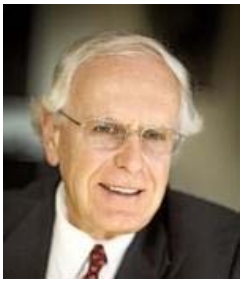
IT: Jon Van

Elaine M. MacDonald

Amy Huang

$: Ora Leshchinsky

Plenary Lectures



- June 8, 2009 (Biot Lecture)
  Prof. Zdeněk P. Bažant
  Department of Civil & Environmental Engineering
  Northwestern University, USA
  Modeling of Creep and Hygrothermal Deformations of Concrete: Intriguing Consequences of Nano-Porosity

- June 9, 2009 (Mindlin Lecture)
  Prof. James R. Rice
  School of Engineering and Applied Sciences & Department of Earth and Planetary Sciences, Harvard University, USA
  Some Fluid-Solid Interactions in Earthquake and Glacier Dynamics

- June 10, 2009 (Burmister Lecture)
  Prof. Fumio Tatsuoka
  Department of Civil Engineering, Tokyo University of Science, Japan
  Rate Effects on Elastic and Inelastic Stress-Strain Behaviours of Geomaterials Observed in Experiments

Keynote Lectures

- Prof. Zhigang Suo (Harvard University)
  Large Deformation and Instability in Swelling Polymeric Gels
- Prof. Franz-Josef Ulm (MIT)
  The Nanogranular Nature of Hydrated Porous Materials: Concrete, Shale and Bone
- Prof. Jerry M. Harris (Stanford University)
  Differential Acoustic Resonance Spectroscopy
- Prof. Shaul Sorek (Ben-Gurion University of the Negev, Israel)
  Shock Wave through Deformable Saturated Porous Media
- Prof. Ronaldo I. Borja (Stanford University)
  A Framework for Coupled Solid-Deformation/Fluid-Diffusion Analysis of Variably Saturated Slopes
- Prof. Stephen C. Cowin (City College of the City University of New York)
  Poroelastic Models of Bone Tissue

Sessions and Chairs

- Poroelastic Mechanics of Bone Tissue and Measurements (Prof. Stephen C. Cowin) 1
- Numerical Investigation of Coupled Problems in Continuum Biomechanics (Prof. Jacques M. Huyghe) 2
- Poromechanical Modeling of CO_2 Sequestration (Prof. Massimiliano Ferronato, Prof. Giuseppe Gambolati) 3
- Multiphase Fluid Flow in Deformable Porous Media (Prof. Marte Gutierrez) 4
- Unsaturated Geomaterials (Prof. Ning Lu) 6
- Micro-Mechanics of Granular Porous Media (Prof. Mourad Zeghal) 8
- Multi-Scale and Stochastic Modeling of Porous Media (Prof. X. Frank Xu, Prof. George Deodatis) 9
- Multi-Scale Characterization of Pavement Materials (Prof. Huiming Yin) 10
- Thermodynamics and Related Issues in Poromechanics (Prof. Zimmerman, Prof. Haim Waisman) 11
- Nonlinear Effects, Shock Waves, and Fractures in Acoustics of Porous and Permeable Media (Dr. James G. Berryman) 12
- Biot Equation in Seismic Wave Propagation (Dr. Pratap Sahay) 13
- Nano-Indentation Material Characterization in Poromechanics (Prof. Christopher Bobko) 15
- Analytical and Computational Solutions to Problems in Poromechanics (Prof. Kanthasamy Muraleetharan, Prof. Younane N. Abousleiman, Dr. Russell T. Ewy) 16

The Second Frank L. DiMaggio Symposium

- Constitutive Models (Prof. Victor Kaliakin, Dr. Ashraf Al-Tahini) 18
- Strain Localization in Saturated and Partially Saturated Porous Media under Dynamic Loading (Prof. Majid T. Manzari) 19

Poroelastic Mechanics of Bone Tissue and Measurements

Chair: Prof. Stephen C. Cowin
City College, City University of New York

10:00 – 12:30; June 8, 2009
Room 555

- **Keynote** - Prof. Stephen C. Cowin (USA)
  Poroelastic Models of Bone Tissue

- 186 Gaffar B. Gailani, Stephen C. Cowin & Luis Cardoso, Mohammed Benalla (USA)
  Measurement of The Permeability of A Single Osteon

- 189 Gaffar B. Gailani & Stephen C. Cowin (USA)
  Russian Doll Poroelasticity; A Model for Fluid Transport in Bone Tissues

- 187 Stephen C. Cowin & Luis Cardoso (USA)
  Fabric Dependent Poroelastic Wave Propagation

- 236 Luis Cardoso & Stephen C. Cowin
  Anisotropic elastic constants of cancellous bone derived from fabric-dependent poroelastic theory and ultrasound wave propagation

- ? 193 Michal Pakula, Mariusz Kaczmarek, Frederic Padilla & Pascal Laugier (Poland)
  Application of Biot's Theory for Modelling of Ultrasonic Wave Propagation in Cancellous Bone

- 234 Ching Hung, Cheng-Ju Lin & Hoe I. Ling (USA)
  Experimental Studies on the Drilling Heat During Dental Implant

- 188 Luis Cardoso, Yuliya Vengrenyuk, Mitchell B. Schaffler & Stephen C. Cowin (USA)
  Ultrasound Wave Propagation in Disuse-Induced Osteoporosis

Numerical Investigation of Coupled Problems in Continuum Biomechanics

Chair: Prof. Jacques M. Huyghe
Eindhoven University of Technology, the Netherlands

09:45 – 12:00; June 10, 2009
Jed D. Satow Room

- 28 L. Orgogozo, F. Golfier, C. Oltean, M. Bues, B. Wood & M. Quintard (France)
  Numerical Approach of Bioreactive Transport in A Porous Medium Including A Biofilm Phase

- 51 Yoshitaka Kameo, Taiji Adachi & Masaki Hojo (Japan)
  Transient and Steady-State Behaviors of Fluid Pressure in Poroelastic Materials under Cyclic Axial and Bending Loading

- ? 75 D. Ambard & F. Cherblanc (France)
  Is annulus fibrosus a non-linear poro-elastic biological tissue ?

- 101 F. Kraaijeveld, J.M. Huyghe, R. Dittmar, J.J.C. Remmers, K. Ito & R. de Borst (Netherlands)
  Cracks in The Degenerating Disc: Microscopic Observation and Partition of Unity Finite Element Simulation

- 107 Elsa Vennat, Denis Aubry, Michel Degrange & Jean-Marie Fleureau (France)
  Microfluidic Model of Porous Media Wetting Application to a Collagen Network

- 194 Jonathan A. Kluge, Nicholas Rosiello, Gary G. Leisk, David L. Kaplan & A. Luis Dorfmann (USA)
  Nonlinear Poroelastic Deformations of Silk Protein Hydrogels

- 221 Leonid Germanovich, Cem Ozan & Srinivasan Mukundan (USA)
  A Mechanism of Subdural Hematoma following Ventriculostomy Procedure

Poromechanical Modeling of CO_2 Sequestration

Chairs: Prof. Massimiliano Ferronato
&
Prof. Giuseppe Gambolati
University of Padua, Italy

09:45 – 12:00; June 9, 2009
Room 477

- 36 G. Duveau, L. Chen & J.F. Shao (France)
  Simplified Approach of Gas Production Effect on Nuclear Waste Repository Stability

- 63 M. Ferronato, G. Gambolati, C. Janna & P. Teatini (Italy)
  Poromechanical Modeling of CO2 sequestration in Exploited Gas Fields

- 66 Darius Seyedi, Nicolas Guy, Sylvie Granet & Clement Chavant (France)
  Probabilistic Modeling of Induced Damage around An Underground Gallery due to Gas Injection

- 105 Tore Ingvald Bjornara, Eyvind Aker & Elin Skurtveit (Norway)
  Coupled Reservoir -Geomechnical Model for CO2 Injection

- 129 Antonin Fabbri, Nicolas Jacquemet & Darius Seyedi (France)
  Modelling of The Chemio-Mechanical Behaviour of A Wellbore Cement Plug in A Context of CO2 Storage

- 211 Sokkheang Sreng, Liming Li, Takashi Sorimachi, Hitomi Sugiyama & Masayuki Saitoh (Japan)
  Underground Water Level Rising Induced Upheaveal Phenomenon in Clay Ground

Multiphase Fluid Flow in Deformable Porous Media

Chair: Prof. Marte Gutierrez
Colorado School of Mines, USA

Session I (10:00 – 12:30; June 8, 2009; Room 569)

- 12 Pooneh Maghoul, Behrouz Gatmiri & Denis Duhamel (France)
  3D Transient Fundamental Solution of Multiphase Porous Media Under Heating

- 22 Shunde Yin, Maurice B. Dusseault & Leo Rothenburg (USA)
  Assessment of the Noordbergum Effect with the Complete Overburden Reaction Considered

- 23 Marte Gutierrez & Imsoo Lee (USA)
  Staggered Solution of the Discretized Fully-Coupled Biot's Equations

- 27 Emilio N.M. Cirillo, Nicoletta Ianiro & Giulio Sciarra (Italy)
  Solid-Fluid Segregation in Saturated Porous Media

- 32 Meysam Najari & Behrouz Gatmiri (Iran)
  The Influence of Vegetation Water Uptake on Moisture and Matric Suction Changes in Multiphase Porous Media

- 53 Maxim Lebedev, Boris Gurevich, Juliana Toms, Ben Clennell, Marina Pervukhina & Tobias M. Muller bias Mueller Florian Karpfinger (Australia)
  Laboratory Observation of Velocity-Saturation Relation Transition during Water Imbibition of Porous Rock

Session II (13:00 – 15:15; June 9, 2009; Room 555)

- **Keynote** Prof. Ronaldo I. Borja (USA)
  A Framework for Coupled Solid-Deformation/Fluid-Diffusion Analysis of Variably Saturated Slopes: Mathematical Developments and Numerical Simulations of Coos Bay Experimental Catchment

- 83 Koji Yamamoto & Masanori Kurihara (Japan)
  Gas Hydrate Production from Geological Formations as Transport Phenomena

- 84 E. Omdal, M.V. Madland, R. Renli, T.G. Kristiansen, A. Hiort, R.I. Korsnes & T. Hildebrand-Hadel (Norway)
  Laboratory Observation with Implications for Depletion of Chalk Reservoirs

- 85 Evgeniy Tantserev, Christophe Y. Galerne & Yuri Y. Podladchikov (Norway)
  Multi-Phase Flow in Multi-Component Porous Visco-Elastic Media

- 110 Jean Sulem & Siavash Ghabezloo (France)
  Undrained Heating of Geomaterials: Pore Pressure Increase and Chemical Couplings

- 167 Luis E. Vallejo (USA)
  The Influence of Isolated Fissures on the Hydraulic Conductivity of Clays

Session III (09:45 – 12:00; June 10, 2009; Room 569)

- 202 Jean-Michel Pereira & Vincenzo De Gennaro (France)
  Time Dependent Behavior of Fluids Filled Geomaterials: Application to Reservior Formations

- 210 Euripedes Papamichos & Ioannis Vardoulakis (Greece)
  Two-Phase Flow in Hollow Cylinder Sand Production Tests

- 212 Amir Ahrari, Mahdi Khalilzad-Sharghi & Behrouz Gatmiri (Iran)
  Dissolved Pollutant Transport through Multiphase Porous Medium

- 217 Takatoshi Ito, Akira Igarashi & Koji Yamamoto (Japan)
  Laboratory Test of Hydraulic Fracturing in Unconsolidated Deformable Rocks

- 219 Touradj Tayebie & Behrouz Gatmiri (Iran)
  Water Retention Curve Effect on the Deformable Porous Media Response to Migration of NAPL under Non-isothermal Immiscible Multi-Phase Flow Situation

Unsaturated Geomaterials

Chair: Prof. Ning Lu
Colorado School of Mines, USA

Session I (09:45 – 12:00; June 9, 2009; Jed D. Satow Room)

- 3 William J. Likos (USA)
  Pore-Scale Modeling of Capillary Stress in Unsaturated Soil

- 9 C. Arson & B. Gatmiri (France)
  Damage in Unsaturated Porous Media: Theory, Algorithmic and Numerical Application

- 34 H.B. Bian, Y. Jia, T. Nishimura & I. Shahrour (France)
  Influence of Gas on The Liquefaction Resistance of Unsaturated Sandy Soil

- 37 G. Chao, D. Smeulders & M.E.H. van Dongen (Netherlands)
  The Lamb Problem in Partially Saturated Porous Media

- 40 Sahar Hemmati, Behrouz Gatmiri, Yu Jun Cui & Marc Vincent (France)
  Prediction of Clayey Soils Settlements Resulted by Soil-Atmosphere Interactions And Climatic Conditions

- 65 Mikael Ramos Da Silva, Christian Schroeder & Jean-Claude Verbrugge (Belgium)
  Poroelastic Behavior of A Limestone: An Experimental Study

- 68 Noushine Shahidzadeh-Bonn, Francois Bertrand, Daniel Bonn& Xavier Chateau (Netherlands)
  Salt Deterioration of Porous Materials subject to Repeated Cycles of Wetting and Drying

Session II (15:45 – 18:00; June 9, 2009; Jed D. Satow Room)

- 71 Olivier Coussy & Jean-Michel Pereira (France)
  Modelling Plasticity of Unsaturated Soils in A Thermodynamically Consistent Framework

- ? 73 M. Nazarali , B. Gatmiri, V. Degennaro & N. Sultan (France)
  Behavior of Unsaturated Marine Sediments Containing Gas Hydrate

- 93 Daria Monaenkova, Konstantin G. Kornev, Xi Ren & Yuris Dzenis (USA)
  Absorption-Induced Deformations in Nanofiber Materials: Freely Suspended Yarns And Webs

- 106 Xavier Chateau & Tran Bao Viet (France)
  Influence of The Temperature on The Behavior of Unsaturated Porous Media: A Micromechanical Approach

- 177 F. Lagier, N. de Jenlis, F. Benboudjema & C. De Sa (France)
  Drying Shrinkage of Cement-Based Materials: Effects of Drying Rate and Aggregate Restrain

- 190 G. Mitaritonna, J. Pineda, M. Arroyo & E. Romero (Spain)
  The Effect of Drying-Wetting Cycles on The Anisotropic Seismic Properties of A Claystone

- 206 Tien Dung Tran Ngoc, Jolanta Lewandowska, Henri Bertin, Michel Vauclin & Lan Chi Do Hong (France)
  Dispersion in Double-Porosity Unsaturated Medium: From Experiment toward Modeling by Homogenization

Session III (09:45 – 12:00; June 10, 2009; Room 555)

- 196 Dashnor Hoxha, Naima Belayachi & A. Poutrel (France)
  Simplified Modeling of Swelling Clays Behavior for Nuclear Waste Disposal Buffers

- 197 Usama El Shamy & Natasha Zamani (USA)
  Microscale Numerical Modelling of The Tensile Strength of Wet Granular Soils

- 208 Hossein Nowamooz & Farimah Masrouri (France)
  Analytical and Experimental Studies on The Unsaturated Swelling Soils

- 227 Sophie Cariou, Luc Dormieux & Frederic Skoczylas (France)
  A Constitutive Equation for Argillite

- 222 Rosa Maria Espinosa-Marzal & George W. Scherer (USA)
  Crystallization Pressure Exerted by In-Pore Confined Crystals

- 229 Brice Lecampion & Bruno Huet (France)
  Chemo-Poro-Mechanical Model of MgO Hydration in Hydrated Cement Paste

- *Ning Lu (USA)
  Tensile Strength of Wet Granular Materials

Micro-Mechanics of Granular Porous Media

Chair: Prof. Mourad Zeghal
Rensselaer Polytechnic Institute, USA

Session I (16:00 – 18:15; June 8, 2009; Room 477)

- 45 Nestor R. Suarez, Thomas L. Brandon & James K. Mitchell (USA)
  Discrete Element Modeling of Aging in Granular Media

- 61 V.I. Kondaurov & O.Y. Izvekov (Russia)
  The Model of Saturated Porous Media with An Elastic Brittle Skeleton

- 112 Patrick Baud, Laurent Louis, Alexandra Rolland, Veronika Vajdova& Teng-Fong Wong (France)
  Geometric Attributes of Discrete Compaction Bands and Their Effect on Permeability in Porous Sandstone

- 113 Jose E. Andrade & Xuxin Tu (USA)
  Multiscale Modeling of Granular Media

- 123 Mourad Zeghal & Claudia Medina (USA)
  Effectiv1e and Suction Stresses of Unsaturated Pendular-State Granular Soils

Session II (13:00 – 15:15; June 9, 2009; Room 477)

- 124 Mourad Zeghal, Tewodros Dessalegn, Usama El Shamy & Claudia Medina (USA)
  A Micro-Mechanical Study of the Interaction of Saturated Granular Soils with Pile Foundation

- 145 A.F. Cabalar & A. Cevik (Turkey)
  An Artificial Neural Network Application in Composite Granular Matrices

- 156 Jerome Fortin, Sergei Stanchits, Georg Dresen & Yves Gueguen (France)
  Micro-Mechanisms Involved during Inelastic Deformation of Porous Carbonate Rocks

- 203 Olivier Coussy & Mickael Thiery (France)
  Drying Asymptotics

- 205 Eric Lemarchand & Teddy Fen-Chong (France)
  A First Micromechanics Analysis of Freezing Processes in Geomaterials

Multi-Scale and Stochastic Modeling of Porous Media

Chairs: Prof. X. Frank Xu
Stevens Institute of Technology, USA
&
Prof. George Deodatis
Columbia University, USA

Session I (13:30 – 15:45; June 8, 2009; Jed D. Satow Room)

- 87 X. Frank Xu (USA)
  A Random-Field Based Orthogonal Expansion Method to Circumvent Curse-of-Dimension in Multiscale Modeling of Random Media Problems

- 7 Marcio A. Murad, Marcio R. Borges & Rosa Aguilar (Brasil)
  A New Upscaling Scheme for Flow in Strongly Heterogeneous Poroelastic Media with Long-Range Correlations

- 58 M. Berveiller, Y. Le Pape, J. Sanahuja & A. Giorla (France)
  Sensitivity Analysis and Uncertainty Propagation in Multiscaled Modeling of Concrete

- 96 Azadeh Mohebi, Paul Fieguth & Marios Ioannidis (Canada)
  Modeling and Reconstruction of Two-Scale Porous Media Using MRI Measurement

- 195 J. Frey, R. Chambon & C. Dascalu (France)
  A Two-Scale Poromechanical Model

- 82 Ying Liu, Azadeh Mohebi & Paul Fieguth (Canada)
  Modeling of Multiscale Porous Media Using Multiple Markov Random Fields

Session II (09:45 – 12:00; June 10, 2009; Room 477)

- 11 Yves Gueguen & Joel Sarout (France)
  Poroelasticity and Effective Elasticity in Porous and Cracked Rocks

- 134 Nicholas P. Chotiros, & Marcia J. Isakson (USA)
  Wave Speed and Dispersion in Fluid-Saturated Granular Media due to Grain Contact Physics

- 64 M.V. Madland, E. Omdal, H. Breivik, R.I. Korsnes, A. Hiorth, & T.G. Kristiansen (Norway)
  Investigation of The Effective Stress Relations for Various Outcrop Chalk

- 15 Mijia Yang (USA)
  Multiscale Analysis of Crack Propagation in a 2D Plate Using Peridynamics

- 48 Joel Sarout, Yves Gueguen, & Emmanuel David (France)
  Frequency Effects and Fluid Pressure Polarization in Porous and Cracked Rocks

- 198 Ahmed Elmekati & Usama El Shamy (USA)
  DEM/FEM Multiscale Technique for Soil-Structure Interaction Problems

Multi-Scale Characterization of Pavement Materials

Chair: Prof. Huiming Yin
Columbia University

10:00 – 12:30; June 8, 2009
Room 477

- ? 160 Guoqing Jing, Juan Martinez & Samuel Masson (France)
  Polygon Ballast under Different Cyclic Loading Force Amplitude

- 164 Benjamin Lai, Cathrina B. Barros & Huiming Yin (USA)
  Investigation of Rheological Behavior of Asphalt Binder Modified by the Advera Additive

- 170 Ewan Y.G. Chen & Ernian Pan (USA)
  Consolidation of Flexible Pavement Based on A Viscoelastic-Elastic-Poroelastic (VE-E-PE) Model

- 172 Minkyum Kim & William G. Buttlar (USA)
  A Two-Phase Sequential Differential Scheme Modeling Approach for Asphalt Mixtures

- 183 Konrad Mollenhauer, Katharina Metzker, Holger Lorenzl& Michael P. Wistuba (Germany)
  A Continuum Mechanical Multi-Component Model for Asphalt Mixtures. Part I: Experiments for Parameter Identification and Model Verification

- 184 Bjorn Brodersen, Ursula Kowalsky & Dieter Dinkler (Germany)
  A Continuum Mechanical Multi-Component Model for Asphalt Mixtures. Part II: Parameter Identificationand Simulation

- 233 Roberto Soares, Yong-Rak Kim & David H. Allen (USA)
  FEM Multiscale Analysis of Asphaltic Pavements Including Damage

Thermodynamics and Related Issues in Poromechanics

Chairs: Prof. Robert W. Zimmerman
Imperial College, UK
&
Prof. Haim Waisman
Columbia University, USA

13:30 – 15:45; June 8, 2009
Room 477

- 14 Robert W. Zimmerman (UK)
  On The Analogy between Poroelasticity and Thermoelasticity

- 86 B. Zangiabadi, R.I. Korsnes, T. Hildebrand-Habel, A. Hiorth, I.K. Sutarjana, A. Lian & M.V. Madland (Norway)
  Chemical Water Weakwning of Various Outcrop Chalks at Elevated Temperature

- 115 Vitor A. F. Costa (Portugal)
  Thermodynamics for The Heat Transfer Man, and The Law of Volume Increase

- 122 Lynn Schreyer-Bennethum (USA)
  Macroscopic Pressure in Swelling Porous Media

- * Emmanuel David, Nicolas Brantut, Alex Schubnel & Robert Zimmerman
  Sliding Crack Model for the Uniaxial Stress-Strain Curve of Rock

- ? 8 A. P. Gerasev (Russia)
  Variational Principles in Irreversible Thermodynamics with Application to Traveling Wave in a Catalyst Bed

- ? 60 G. Ojeda, G. Marando, M. Bonmati & J.M. Alcaniz (Portugal)
  Time Dependence of Soil Water Hysteresis in A Minesoil Reclaimed by Sewage Sludge Amendments

Nonlinear Effects, Shock Waves, and Fractures in Acoustics of Porous and Permeable Media

Chair: Dr. James G. Berryman
Lawrence Livermore National Laboratory, USA

15:45 – 18:00; June 9, 2009
Room 555

- **Keynote** Prof. Shaul Sorek (Israel)
  Shock Wave Through Deformable Saturated Porous Media

- 26 Serge A. Shapiro (Germany)
  Microseismicity of Non-Linear Fluid-Rock Interactions: From Stimulations of Geothermic Reservoirs to Hydraulic Fracturing of Shales

- 161 Ashot V. Shekoyan & Alexander G. Bagdoyev (Armenia)
  Linear and Nonlinear Waves in Porous Media Filled with Electrolyte

- ? 174 Boris Plyushchenkov & Anatoly Nikitin (Russia)
  New Method for Permeability Evaluation by Acoustic-Electromagnetic Logging

- 175 James G. Berryman (USA)
  Fluid Effects on Seismic Waves in Hard Rocks with Fractures and in Soft Granular Media

- ? 181 M. Kaczmarek, R. Drelich, B. Piwakowski & P. Safinowski (Poland)
  Ultrasonic Reflectometry and Studies of Inhomogeneous Waves in Porous Materials

- 225 Weimin Nian, Kolluru V. Subramaniam & Yiannis Andreopoulos (USA)
  Energy Considerations in Shock Wave Propagation during the Dynamic Compaction of Porous Media

Biot Equation in Seismic Wave Propagation

Chair: Dr. Pratap Sahay
CICESE, Mexico

Session I (13:30 – 15:45; June 8, 2009, Room 569)

- 90 L. De Barros & M. Dietrich (France)
  Estimation of The Poroelastic Parameters from Seismograms Using The Biot Theory

- 41 Christina Morency, Yang Luo & Jeroen Tromp (USA)
  Spectral-Element Simulations of Wave Propagation in Porous Media: Finite-Frequency Sensitivity Kernels based upon Adjoint Methods

- 16 Florian Karpfinger, Boris Gurevich & Andrey Bakulin (Australia)
  Axisymmetric waves in fluid-saturated porous Structures

- 92 Boris Gurevich, Dina Makarynska & Marina Pervukhina (Australia)
  A New Squirt-Flow Model of Elastic Wave Attenuation and Dispersion in Fluid-Saturated Rocks

- 76 B.B.S.A. Vogelaar & D.M.J. Smeulders (Netherlands)
  Effective Biot Theory for The Speed And Attenuation of Seismic Waves in Saturated Rocks Containing Small Gas Fractions

- 79 Tobias M. Muller & Pratap N. Sahay (Mexico)
  Compressional Wave Attenuation and Dispersion due to Conversion Scattering into Slow Shear Wave

Session II (16:00 – 18:15; June 8, 2009; Room 555)

- **Keynote** Prof. Jerry M. Harris (USA)
  Differential Acoustic Resonance Spectroscopy: A Laboratory Method for the Estimation of Compressibility and Attenuation of Porous Materials at Low Frequencies

- 49 Patrick N.J. Rasolofosaon & Bernard E. Zinszner (France)
  Poroelastic Equations Closely Examined by Ultrasonic Experiments in Rocks

- * Youcef Bouzidi & Douglas R. Schmitt (Canada)
  Laboratory Observations of the Transmissivity and Reflectivity of a Water-saturated Porous Plate

- 39 F.C. Schoemaker & D.M.J. Smeulders (Netherlands)
  Experimental Determination of the Electrokinetic Coupling Coefficient

- 35 Menne D. Schakel & David M.J. Smeulders (Netherlands)
  Seismoelectric Reflection Coefficients: Measurements and Theoretical Predictions

Session III (13:00 – 15:15; June 9, 2009; Room 569)

- 2 Maria Todorovska & Yousef Al Rjoub (USA)
  Soil-Structure Interaction and Biot's Theory of Wave Propagation in Poroelastic Media as Possible Explanation for Observed Changes of Apparent Frequencies of Vibration of A Building with Heavy Rainfall

- 230 Donald G. Albert, Stephen N. Decato & Frank E. Perron, Jr. (USA)
  Experimental Measurements of the Biot Slow Wave in Natural Snow Covers

- 47 Robert J. Galvin & Boris Gurevich (Australia)
  Interaction of A Longitudinal Wave with A Circular Crack in A Fluid-Saturated Porous Medium

- 137 Valeri A. Korneev, Andrey A. Ponomarenko & Boris M. Kashtan (USA)
  Stoneley Slow Wave: What is Missing in Biot's Theory

- 162 M. Markov, E. Kazatchenko & A. Mousatov (Mexico)
  Propagation of Low Frequency Surface Waves in Poroelastic Media

- 25 K.N. van Dalen, A. Mahdad, G.G. Drijkoningen & D.M.J. Smeulders (Netherlands)
  Wave Modes at The Interface of a Fluid and A Fluid-Saturated Poroelastic Solid

Nano-Indentation Material Characterization in Poromechanics

Chair: Prof. Christopher Bobko
North Carolina State University, USA

Session I (09:45 – 12:00; June 9, 2009, Room 555)

- **Keynote** - Prof. Franz-Josef Ulm (USA)
  The Nanogranular Nature of Hydrated Porous Materials: Concrete, Shale and Bone

- 133 J.Alberto Ortega, Christopher Bobko, Franz-Josef Ulm & Younane N. Abousleiman (USA)
  The Nanogranular Origin of Macroscopic Elasticity Properties of Geomaterials

- 141 Christopher P. Bobko & Franz-Josef Ulm (USA)
  Assessing the Nanogranular Morphology, Elasticity, and Strength of Porous Clay in Shale by Nanoindentation

- 125 Matthieu Vandamme & Franz-Josef Ulm (USA)
  Nano-Porosity as the Governing Parameter of Creep of Calcium-Silicate-Hydrates

- Andreas Fritsch, Luc Dormieux, Christian Hellmich, & Julien Sanahuja (Austria)
  Elasticity and Strength of Porous Hydroxyapatite Biomaterials: A Continuum Micromechanics Approach

Session II (15:45 – 18:00; June 9, 2009, Room 477)

- 142 G. Constantinides, I. Kalcioglu, J.F. Smith & K.J. Van Vliet (Cyprus)
  Nanoindentation in Fluid: A Pathway to Porochemical Materials Characterization

- 135 Minh H. Tran , Younane N. Abousleiman, Son K. Hoang, J. Alberto Ortega & Franz-J. Ulm (USA)
  The Make Up of Nano-Indentation in Engineering Applications

- 97 Valeriya Shulakova, Marina Pervukhina, Tobias M. Muller, Maxim Lebedev, Fabian Wenzlau, Boris Gurevich & Ben Clennell (Australia)
  Finite-Difference Simulations and Laboratory Measurements of Attenuation and Dispersion in Patchy-Saturated Rocks

- 103 Siavash Ghabezloo, Jean Sulem, Sylvine Guedon & Jeremiec Saint-Marc (France)
  Poromechanical Behaviour of A Hardened Oil-Well Cement Paste

- 224 Xiaojun Wang, Kolluru V. Subramaniam & Feng-Bao Lin (USA)
  Investigation of Microstructure Evolution in Cement Paste through Setting using Poroelastic Parameters obtained from Ultrasonic Wave Reflection

Analytical and Computational Solutions to Problems in Poromechanics

Chairs: Prof. Kanthasamy Muraleetharan, Prof. Younane N. Abousleiman
University of Oklahoma, USA
&
Dr. Russell T. Ewy
Chevron Energy Technology Co., USA

Session I (13:30 – 15:45; June 8, 2009; Room 555)

- **Keynote** Prof. Zhigang Suo (USA)
  Large Deformation and Instability in Swelling Polymeric Gels

- 178 Martin Schanz & Loris Nagler (Austria)
  Consistent Poroelastodynamic Plate Theories

- 220 Rafid Al-Khoury (Netherlands)
  Poroelastic Spectral Element for Biot Theory of Wave Propagation

- 231 George W. Scherer, Jean H. Prevost & Zhihua Wang (USA)
  Finite Element Analysis of The Bending of A Saturated Beam

- 204 G. Quiroga-Goode & K. van Wijk (Germany)
  Experimental Evidence of Non-Linear Dissipation Using Acoustic Micro-Lapses

- 235 Martin Schanz (Austria)
  Storage Reduced Poroelastodynamic Boundary Element Formulation in Time Domain

Session II (16:00 – 18:15; June 8, 2009; Room 569)

- 108 W. Kaewjuea, T. Senjuntichai & R.K.N.D. Rajapakse (Thailand)
  Analytical Solution of A Finite Poroelastic Solid Cylinder

- 116 Younane N. Abousleiman & Shengli Chen (USA)
  Poromechanics Response of An Inclined Borehole Subjected to In-Situ Stresses and Finite Length Fluid Discharge

- 131 Son K. Hoang & Younane N. Abousleiman (USA)
  Poroviscoelasticity of Transversely Isotropic Cylinders

- 136 Vinh X. Nguyen & Younane N. Abousleiman (USA)
  Dual-Porosity and Dual-Permeability Poromechanics Solutions of Isotropic Hollow Cylinders

- ? 173 William G. Pariseau (USA)
  Excavation Analysis of Porous, Jointed Rock masses using Equivalent Coupled Properties and Influence Functions

Session III (09:45 – 12:00; June 9, 2009; Room 569)

- 42 Thi Thu Huong Le, Fekri Meftah & Hocine Boussa (France)
  A Multi-Scale Thermo-Hydral Modelling of Concrete Behaviour at High Temperatures

- 130 Dinesh R. Katti, Kalpana S. Katti, Priyanthi Amarasinghe & Shashindra Pradhan (USA)
  Interlayer Fluid Flow and the Role of Clay-Fluid Molecular Interactions on the Swelling Behavior of Montmorillonite Clays

- 155 X.T. Chen, C.A. Davy, F. Skoczylas & J.F. Shao (France)
  Analysis of Thermal Damage Effects on Poroelastic Properties of Cement-Based Materials

- 232 Zhenhua Sun & George W. Scherer (USA)
  Effect of Air Voids on The Dilatation of Mortar during Freezing

- *Kanthasamy K. Muraleetharan (USA)
  Elastoplasticity of Three-Phase Porous Media

- 118 Poonam Khurana & Walter Lauriks (Belgium)
  On Imperfect Interfaces in Multilayered Poroelastic Structures

Session IV (15:45 – 18:00; June 9, 2009; Room 569)

- 50 G. Lefeuve-Mesgouez & A. Mesgouez (France)
  Stiffness Matrix Formulation for Poroviscoelastic Multilayered Ground Subjected to Moving Loads

- 56 A. Mesgouez & G. Lefeuve-Mesgouez (France)
  Semi-Analytical Approach for Homogeneous and Multilayered Porous Ground Vibrations due to Transient Excitations

- 59 Philippe G. Young, Bruno Notarberardino, Brian Walker, Walter Fourie& Ash Harkara (UK)
  Computational Simulation of Mechanical and Multi-physics Behavior of Porous Media

- 117 Shengli Chen & Younane N. Abousleiman (USA)
  Time-Dependent Behavior of A Rigid Foundation on A Transversely Isotropic Soil Layer

- 163* Ashraf Al-Tahiti & Younane Abousleiman (USA)
  Pore Pressure Coefficient Anisotropy Measurements for Intrinsic and Induced Anisotropy in Sandstone

- 169 Jianxin Liu, Jishan Liu & Keyu Liu (Australia)
  Impact of Rock Heterogenity on Hydromechanical Interactions -- A Porosity-Based Model

The Second Frank L. DiMaggio Symposium: Constitutive Models

Chairs: Prof. Victor Kaliakin
University of Delaware, USA
&
Dr. Ashraf Al-Tahini
Aramco Company, Saudi Arabia

Session I (10:00 – 12:30; June 8, 2009; Jed D. Satow Room)

- 67 Tadatsugu Tanaka (Japan)
  Numerical Methods for Consolidation of Viscoplastic Clay

- 207 Kristian Krabbenhoft (Australia)
  Mathematical Theory of Plasticity for Frictional Materials

- 89 Majid T. Manzari (USA)
  On Material vs. Structural Response of Saturated Granular Soil Specimens

- 216 Lavinia Stefan, Farid Benboudjema, Jean Michel Torrenti & Benoit Bissonnette (France)
  Behavior of Concrete at Early Stage using Percolation and Biot's Theory

- #201 Gaetano Elia & Angelo Amorosi (Italy)
  Constitutive Models with Kinematic hardening: Effects on Anisotropy and Non-Coaxiality

- 226 Huabei Liu (USA)
  Modeling Sand Behavior through Associate Flow Rule

- 94 Victor N. Kaliakin & Ping Jiang (USA)
  Investigation of Mixed Elements with Continuous Pressure Approximations as Applied to Problems in Geomechanics

Session II (16:00 – 18:15; June 8, 2009; Jed D. Satow Room)

- #18 F. Oka, A.P. Heitor, N. Kita & S. Kimoto (Japan)
  Effect of Poisson's Ratio on The Dynamic Instability in Water-Saturated Elasto-Plastic Soil

- 98 Sonia Fortuna (Australia)
  Some Observations on The Stress-Strain-Time Behaviour And Undrained Strength of Natural Pisa Clay Along Predominatly Deviatoric Stress Path

- 33 Qassun S. Mohammed Shafiqu, Mohd R. Taha & Jasim M. Abbas (Iraq)
  Analysis of Consolidation Problem in Several Types of Cohesive Soils using the Bounding Surface Model

- 151 Ai Chung & Hoe I. Ling (USA)
  Evaluation of Generalized Plasticity Based Sand Models in ABAQUS

- 152 Ben Leshchinsky & Hoe I. Ling (USA)
  Revisiting Deformation Analysis for the Kansai International Airport

- 95 Ping Jiang & Victor N. Kaliakin (USA)
  Investigation of Non-Conforming Elements for Geomechanical Applications

Strain Localization in Saturated and Partially Saturated Porous Media under Dynamic Loading

Chair: Prof. Majid T. Manzari
George Washington University, USA

13:00 – 15:15; June 9, 2009
Jed D. Satow Room

- 69 F. Luzon, A. Garcia-Jerez , M.A. Santoyo & F.J. Sanchez-Sesma (Spain)
  A Hybrid Technique to Compute The Pore Pressure Changes due to Time Varying Loads: Application to The Impounding of The Itoiz Reservoir, Northern Spain

- ? 78 Y. Jia, H.B. Bian, G. Duveau & J. F. Shao (France)
  Hydromechanical Modelling the Swelling Clay Buffer in Underground Storages

- 99 Sonia Fortuna & Andrew J. Whittle (Australia)
  Prediction of The Small Strain Behavior of Natural Pisa Clay By Means of the MIT-S1 Constitutive Model

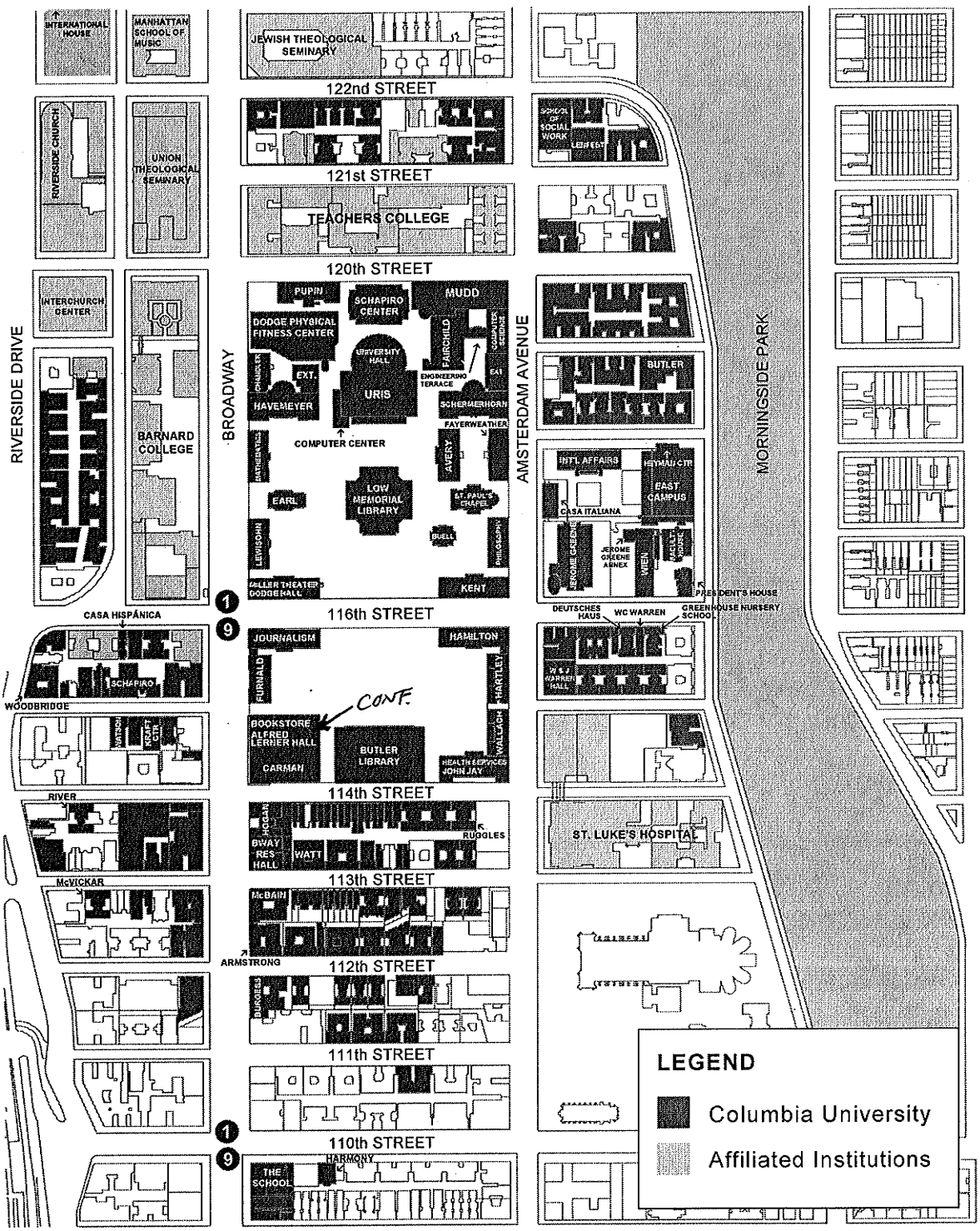
- 111 Richard A. Regueiro (USA)
  Dynamic Strain Localization in a Simple Saturated Geomaterial at Finite Strain

- 127 Nicolas Brantut , Alexandre Schubnel, Jerome Corvisier, Fabrice Brunet & Toshihiko Shimamoto (France)
  Thermo-Chemical Pressurization of Clay Bearing Fault Gouge

- 150 Jianhong Jiang & Hoe I. Ling (USA)
  A General Bounding Surface Model for Clays

- 165 John W. Rudnicki (USA)
  Localization in Undrained Deformation

- 180 O. Maurel, T. Ress, M. Matallah, W. Chen, C. La Borderie & G. Pijaudier-Cabot (France)
  Permeability and Microcracking of Mortar Subjected to Dynamic Loading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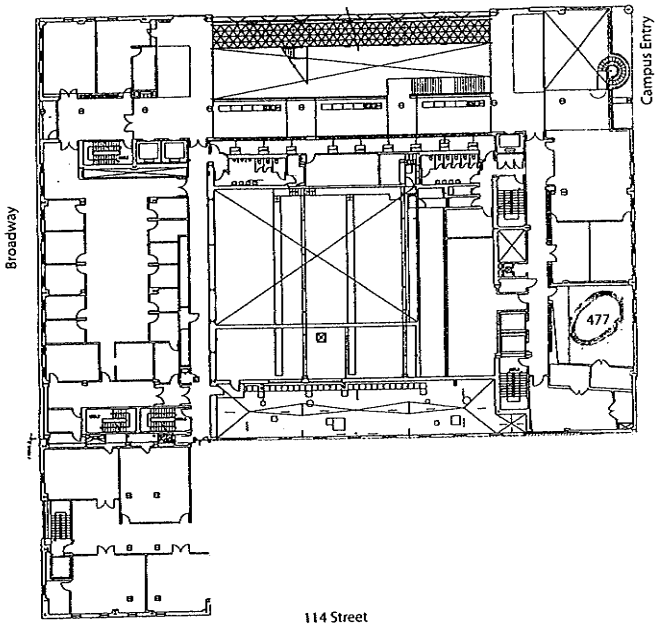

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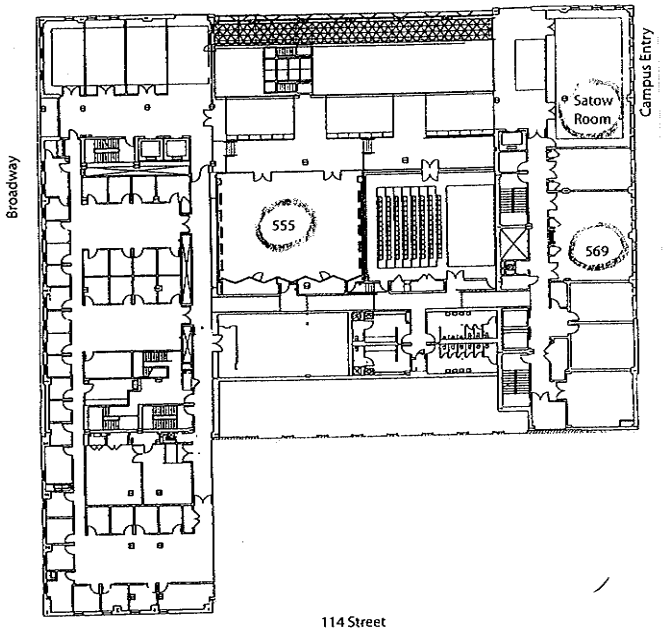

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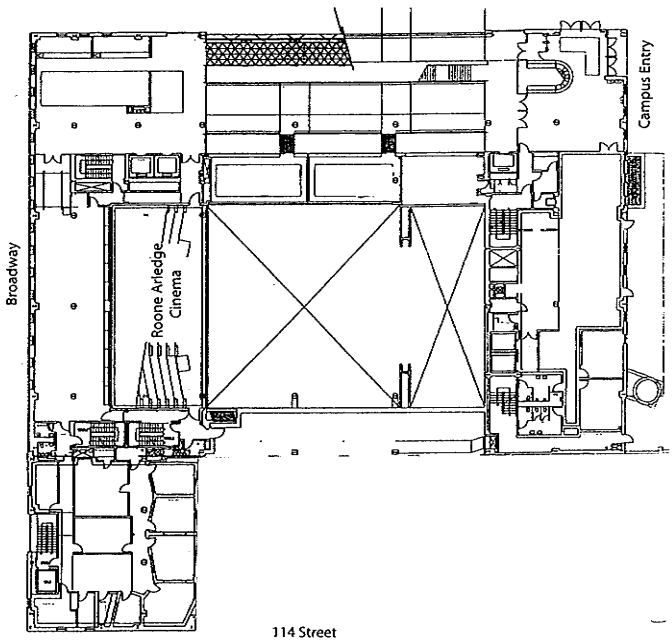

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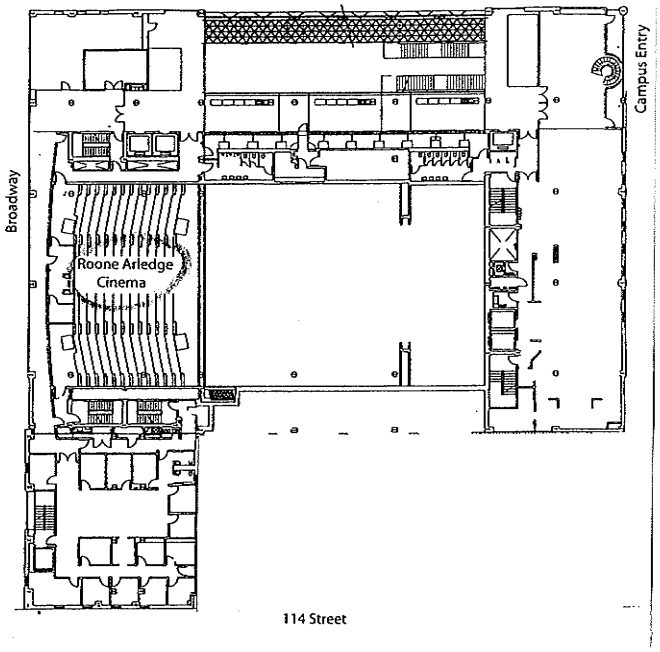

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