SUMMARY OF ACTIVITIES

IOWA INSTITUTE OF HYDRAULIC RESEARCH
COLLEGE OF ENGINEERING
THE UNIVERSITY OF IOWA
IOWA CITY, IOWA  52242  USA

for the period

July 1, 1996 – June 30, 1997
## SUMMARY OF ACTIVITIES

**IOWA INSTITUTE OF HYDRAULIC RESEARCH**  
**COLLEGE OF ENGINEERING**  
**THE UNIVERSITY OF IOWA**  
**IOWA CITY, IOWA**  
**July 1, 1996 through June 30, 1997**

### ACTIVE SPONSORED RESEARCH PROJECTS

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<td>* Hydraulic Model Study of Circulating Water Pump Structure for Marmara Erglisi Power Plant</td>
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<td>* ** Develop Computational Thermal Model to Analyze Present Ability of Cooling Pond at Dresden Station to Adequately Dissipate Heat Under Various Environmental and Operating Conditions</td>
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<td>** The Effects of Climate Variability on the Occurrence of Extreme Precipitation in the Upper Midwest</td>
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<td>* ** A Color PIV System for Multiphase Flows</td>
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<td>* ** Large-Eddy Simulation of Turbulent Two-Phase Flow</td>
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<td>* Lower Granite Dam SBC Numeric Interpolation</td>
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* Lower Granite Dam SBC Physical Modeling of Behavioral Guidance Structure


** Ice Engineering: Design Criteria for Protecting Riverine and Marine Structures Against Ice Action

CRREL Landweber

** Effects of Channel Modifications and Project Operations on Ice Conveyance in Rivers

CRREL Ettema, Holly

** Sediment at LaSalle County Station Sponsor Duke Engineering

DES Jain

Aerodynamics of Phonation

DHHS Patel

Enhanced Performance and Reliability of Water Intakes for Generating Stations

EPRI Ettema, Nakato, Odgaard, Patel, Weber

** Powerplant Cooling Along the Missouri River: Coping with Hydrometeorological and Regulatory Change

EPRIa Holly, Krajewski

Techniques for Weakening the Ice-Runway Interfacial Bond

FAA Nixon

** Stochastic Dynamic Modeling of Space-Time Tropical Rainfall

HRC Krajewski

** Hydraulic Model Study to Determine Hydraulic Characteristics of Screen

HSC Weber

** Water Quality Protection in Dry Creek

IDALS Johnson

** Development of a Model for the Ice Scraping Process

IDOT Nixon

** Iowa Highway Research Board/Full Scale Field Measurements of Ice Scraping Loads

IDOT Nixon

** Highway Maintenance Concept Vehicle Prospectus

IDOT Nixon

* Optimal Usage of De-icing Chemicals When Scraping Ice

IDOT Nixon

* Test Plan for Snowplow Cutting Edge

IDOT Nixon

* Determining the Optimal Usage of Chemicals in Winter Highway Maintenance

IDOT Nixon

* Maximizing the Use of Roadway Weather Information Systems

IDOT Nixon

** Field Measurements of Ice Scraping Loads on Front Mounted Plow Blades

IHRB Nixon


** Upper Mississippi River Illinois Waterway Navigation Study: Streambank Erosion  
ISWS  Nakato

* Use of Raman Lidar to Assist in Measuring Water Vapor and Complete Modification of Lidar Software for Flux Estimation Over Complex Terrain  
LANL  Eichinger

** Thermal Modeling and Field Verification of Riverside Generating Station  
MAE  Parrish, Holly

** Statistical and Physical Framework for Design and Verification of Climatological Precipitation Estimation Methods Using Remote Sensing Measurements: Graduate Fellowship  
NASA  Krajewski, Ciach

Development of Ground Radar Rainfall Estimation Methodology for Validating TRMM Satellite Rainfall Estimates  
NASA  Krajewski

* Validation of Rainfall Estimates from Space-Borne Radars: Graduate Fellowship  
NASA  Krajewski, Kucera

* Ground-Based Radar-Rainfall Estimation for the Guam and Key West TRMM  
NASA  Krajewski, Kruger

** Rainfall As a Space-Time Process and its Climatology Estimated from Space: Graduate Fellowship  
NASA  Krajewski, McCollum

* Icing of Planar Surfaces  
NASA  Ettema

** Studies to Improve the Mean Field Bias Adjustment Algorithm of the Precipitation Processing System of NEXRAD  
NOAA  Krajewski

** Investigation of the Surface Reference Data Center (SRDC) Validation Sites and Validation Techniques to Determine Reliability of SRDC Estimates  
NOAA  Krajewski

* Investigate WSR-88D Radar Range Effects in Radar-Rainfall Estimation  
NOAA  Krajewski

Development of RADAP-II Radar Database for the United States  
NSF  Krajewski, Kruger

** Engineering Research Equipment: PIV System  
NSF  Marshall, Patel

Rain Drop-Size Distribution and Rainfall Measuring System  
NSF  Krajewski, Kruger, Bradley

US-Japan Cooperative Science: Development and Applications of Computational Fluid Dynamics to Ship Design  
NSF  Stern, Paterson, Longo, Patel

* US Student Participation at the 27th Congress of the IAHR, 1997  
NSF  Nakato

Near-Field Ship Hydrodynamics (Augmentation Award for Engineering Research Training)  
ONR  Stern

Free-surface Effects on Boundary Layers and Wakes  
ONR  Stern

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<td>CFD Methods for Complex Marine Propulsors</td>
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<td>Model Study to Site Juvenile Fish Bypass Outfalls Downstream of Wanapum and Priest Rapids Dams and 3-D Numerical Simulation of Flows in the Study Reaches</td>
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<td>Snow Plow Cutting Edge Evaluation</td>
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<td>Provide Drawings and a Cost Estimate of a Special Design Circulation Flume for Fish Behavior</td>
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<td>** Data Reduction and Evaluation of Precipitation Records</td>
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<td>** Coding and Testing of Existing Mobile Bed Algorithms of CH3D Model</td>
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Abbreviations

Army/UCONN  Army/University of Connecticut
ARO  U.S. Army Research Office
ASCE  American Society of Civil Engineers
BAM  Burns & McDonnell Engineering Company, Inc.
BI  Bechtel, Inc.
BVI  Black and Veatch
CECo  Commonwealth Edison Company
CGRER  Center for Global and Regional Environmental Research
CIFRE  (UI) Central Investment Fund for Research Enhancement
CIPS  Central Illinois Public Service
COE(RI)  U.S. Army Corps of Engineers, Rock Island District
COE/SENES  U.S. Army Corps of Engineers, SENES Oak Ridge
CRREL  U.S. Army Cold Regions Research and Engineering Laboratory
DES  Duke Engineering & Services
DHHS  Department of Health and Human Services
EPRI  Electric Power Research Institute
EPRILA  Electric Power Research at Iowa (Funded by Iowa's Investor-Owned Utilities)
FAA  Federal Aviation Administration
HRC  Hydrologic Research Center
HSC  Hendrick Screen Company
IDALS  Iowa Department of Agriculture and Land Stewardship
IDOT  Iowa Department of Transportation
IHRB  Iowa Highway Research Board
ISWS  Illinois State Water Survey
LANL  Los Alamos National Lab
MAE  MidAmerica Energy Corporation
NASA  National Aeronautics and Space Administration
NOAA  National Oceanic and Atmospheric Administration
NSF  National Science Foundation
ONR  Office of Naval Research
PSU  Penn State University
PUD-CC  Public Utility District No. 1 of Chelan County (Washington)
PUD-GC  Public Utility District of Grant County
PWA  Phillip Williams & Associates, Ltd.
SAF  St. Anthony Falls
Samsung  Samsung Heavy Industries Co. Ltd.
SCI  Stanley Consultants, Inc.
SD DOT  South Dakota Department of Transportation
SER  Society for Ecological Restoration
UCONN  University of Connecticut
UE  Union Electric
UI  University of Iowa
USAID  U.S. Agency for International Development
US Army  U.S. Army
USBR  U.S. Bureau of Reclamation
USDA  U.S. Department of Agriculture
UWM  University of Wisconsin, Milwaukee
WES  Waterways Experiment Station
JULY 1996 THROUGH JUNE 1997 PUBLICATIONS

Institute of Hydraulic Research
The University of Iowa

IIHR REPORTS


IIHR LIMITED DISTRIBUTION REPORTS


MONOGRAPHS

JOURNAL ARTICLES


PAPERS PRESENTED AT CONFERENCES PUBLISHED IN PROCEEDINGS


PRESENTATIONS AT CONFERENCES AND WORKSHOPS


Mutel, C.F., “Prairie Past and Future: Rediscovering a Lost World,” Univ. of Iowa Art Museum Lecture Series, Iowa City, IA, 16 October 1996.


Stern, F., "CFD Verification and Validation for Naval Surface Combatants," ONR Workshop on Surface Ship Hydrodynamics, David Taylor Research Center, Bethesda MD, 8 October 1996.


Stern, F., "CFD for Naval Surface Combatants," ONR Workshop on Bubbly Ship Wakes, Naval Coastal Systems Station, Panama City, FL, 8 November 1996.


DISCUSSIONS


BOOK PUBLICATIONS


BULLETINS

OTHER


Mutel, C., “The Historic Role of Iowa’s Trees,” in Famous and Historical Trees of Iowa, Iowa Dept of Natural Resources, Des Moines, 1996, pp. 4-16.


Mutel, C., IOWATCH, Newsletter of the Center for Global and Regional Environmental Research, The University of Iowa, Iowa City, IA, Fall 1996, Spring 1997.


PH.D. THESIS ACCEPTED


M.S. THESIS ACCEPTED


M.S. WITHOUT THESES
AWARDS, RECOGNITIONS, EXTERNAL COMMITTEE ASSIGNMENTS
of IIHR STAFF and STUDENTS
1996-97

National and International Recognitions

Research Staff

Bradley
National Science Foundation CAREER Faculty Career Development Award, 1997.

Eichinger
Allen Prize, Optical Society of America, 1996.

Ettema
Among 22 engineers from around the world invited to make presentations at Hiroshima Japan's International Workshop of Floodplain Risk Management, 1996.
Invited by the President of Japan's Water Resources Development Corporation to present to government officials a non-partisan assessment of the future of dams in the U.S.A., 1996.

Holly
Selected to U.S. Army Waterways Experiment Station Peer Review Board, 1997 - .

Jain
Invited to deliver a special lecture at the University of Roorkee (India) Sesquicentennial celebration, 1996.

Krajewski
Member, National Atmospheric and Space Administration Tropical Rainfall Measuring Mission Science Team, 1993 - .
Member, National Academy of Science Board on Atmospheric Sciences and Climate, 1993-97.

Marshall

Meselhe
Full scholarship to attend the National Partnership for Advanced Computational Infrastructure Parallel Computing Institute, 1997.

Nakato
Among 22 engineers from around the world invited to make presentations at Hiroshima Japan's International Workshop of Floodplain Risk Management, 1996.
Invited by the President of Japan's Water Resources Development Corporation to present to government officials a non-partisan assessment of the future of dams in the U.S.A., 1996.
Member, Panel of Experts for the Upper Indravati Hydroelectric Project for the State of Orissa, India and the World Bank, 1993 - .

Nixon
Invited by Finnish Road Administration to give a talk on winter highway maintenance research, 1997.
Offshore Mechanics and Arctic Engineering Division Special Achievement Award, 1997.
Member, National Science Foundation Panel Review for SBIR Phase I proposals, 1997.

Odgaard
Invited to give keynote lecture at the Conference of the Korea Water Resources Association, 1997.
Special Adviser for the Meghna Estuary Study (Bangladesh) relating to surface/bottom vanes, 1996.
Invited by Water Resources Planning Commission of Taiwan's Ministry of Economic Affairs to lecture on sediment management, 1997.
Member, Review Group for the graduate programs in Civil Engineering at Virginia Polytechnic Institute and State University, 1997.
Patel
American Society of Mechanical Engineers' Fluids Engineering Award, 1997.
Invited to deliver plenary lecture at the Advanced Fluids Engineering Research Center Annual Meeting and the plenary lecture at the Wind Tunnel Users' Meeting at Pohang Institute of Science and Technology, Pohang, Korea, 1997.

Paterson
Chosen to participate in the U.S. Department of Defense's Computational Grand Challenge Program, 1996 - .

Stern
Chosen to participate in the U.S. Department of Defense's Computational Grand Challenge Program, 1996 - .

Students
Jennifer Holman
NSF Fellow, 1996-99.
C. Bryan Young
NSF Fellow, 1996-99.
Jeff McCullom
Grzegorz J. Ciach
Paul Kucera
NASA Fellow, 1997-98.
Ana Sirviente
Invited to participate in the NSF Engineering Education Scholars Program. Purpose was to gather outstanding students to interact and share insights and ideas into teaching and learning issues, 1996.

Emmanouil Anagnostou

Offices, Committees, Editorial Boards in National and International Professional Societies; Conference Organization

Research Staff
Bradley
American Geophysical Union
Member, American Geophysical Union Large-Scale Field Experimentation Committee, 1994 - .
Chair, Precipitation Committee, 1995 - .
Member, Hydrology Awards Committee, 1995 - .
Hydrology Awards Coordinator, Fall Annual Meeting, 1996.
Chair, American Society of Civil Engineers Task Committee on Measurement Errors in Hydraulic Engineering, 1995 - .
GEWEX Continental-Scale International Project
Member, Science Panel, Large-Scale Area North-Central, 1996 - .
Member, Science Plan Writing Committee, Large-Scale Area North-Central, 1996.

Holly
International Association for Hydraulic Research (IAHR)
Vice President, 1995-97.
Chair, 27th IAHR Congress, 1995-97.
Chair, Task Committee to Professionalize the Secretariat, 1997.
American Society of Civil Engineers
Chair, Task Committee to Host the 27th IAHR Congress, 1995-97.

Krajewski
American Meteorological Society
Member, GEWEX Working Group on Radiative Fluxes, 1995 - .
Member, Hydrologic Research Center Board of Directors, 1993 - .
Member, Organizing Committee of the Sixth International Conference on Precipitation, 1997.

**Nakato**

American Society of Civil Engineers

Chair, Hydraulics Division Technical Committee on Hydraulic Measurements and Experimentation, 1996-97 (Member, 1994-1999).

Member, Scientific Organizing Committee, International Workshop on Floodplain Risk Management held in Japan, 1996.

Member, Local Organizing Committee, 27th Congress of the International Association for Hydraulic Research (Organized the John F. Kennedy Student Paper Competition), 1997.

**Nixon**

Member, American Society of Mechanical Engineers Offshore Mechanics and Arctic Engineering Executive Committee, 1992-97.

Member, A3C09 Transportation Research Board Committee on Winter Highway Maintenance, 1994 - .

**Odgaard**

Member, National Cooperative Highway Research Program panel, 1994 - .

**Patel**

Member, Editorial Board, Computers & Fluids, 1990 - .

**Stern**

Member, Organizing Committee, 3rd Osaka Colloquium on Advanced CFD Applications to Ship Flow and Hull Form Design to be held in Osaka Japan, 1998.

Member, Organizing Committee, Gothenburg 2000: Workshop on Ship Hydrodynamics CFD to be held in Gothenburg, Sweden in 2000, 1996 - .


**Local and State Recognitions and Appointment to Committee**

**Research Staff**

**Bradley**

UI Old Gold Summer Fellowship, 1995-97.
Faculty Delegate Universities Council on Water Resources, 1994 - .

**Ettema**

Secretary, Engineering Faculty Council, 1997.

**Holly**

Invited Iowa ASCE Speaker, American Society of Civil Engineers Water Resources Design Conference, 1997.

**Krajewski**

Chair, College of Engineering Committee of Engineering Computations, 1996-97.

**Lin**

UI Old Gold Summer Fellowship, 1997.

**Marshall**

Member, Engineering Faculty Council, 1995-99.
Member, Executive Committee, ASME Northeast Iowa Professional Section, 1996 - .

**Mutel**

Consulting Editor for Natural History, University of Iowa Press, 1994 - .

Iowa Academy of Science

Conservation and Preserves Committee, 1994-96.

Board of Directors, Johnson County Heritage Trust, 1987 - .
Member, University of Iowa Collections Coalition, 1996 - .
Odgaard
Chairman, Iowa Highway Research Board. 1994 (Member 1993 - ).
Chair, College of Engineering Building Planning Committee, 1995 - .

Patel
Delivered Iowa Distinguished Engineering Faculty Lecture in November at UI and April at ISU, 1997-98.

Weber

Support Staff
Below
Selected by UI's Financial Information and Training Team as a campus representative to review and assess a report about customer needs and services, 1997.

Goss
Regents Award for Staff Excellence, 1997.

Meder
University Award for Staff Excellence, 1997.

Wilson, M.
Appointed as staff representative to Advanced Research Computing Services Advisory Committee, 1997.

Students
Cole
Iowa Incentive Scholar, 1996-97.
## IIHR SEMINAR PRESENTATIONS

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<td>Dr. Richard Smith</td>
<td>University of Florida</td>
<td>An Overview of Some Recent Computational Work in Marine Sail Mechanics</td>
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<td>9/13/96</td>
<td>Dr. Xiang-Hua Xu</td>
<td>Boston University</td>
<td>On Non-Equilibrium Reynolds Stress Models for Complex Turbulent Flows</td>
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<td>Ship Hydrodynamics CFD: Status and Direction</td>
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<td>9/27/96</td>
<td>Dr. Robert V. Wilson</td>
<td>Old Dominion University</td>
<td>Numerical Simulation of Turbulent Jets with Rectangular Cross-Section</td>
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<td>CFD Uncertainty Analysis/Introduction to IIHR SGI Use</td>
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<td>10/25/96</td>
<td>Dr. Frederic Fabry</td>
<td>McGill University, Canada</td>
<td>Extracting the Refractive Index Field (and Hence Moisture) Near the Surface by Radar Using Ground Targets: An Offbeat Idea That Works</td>
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<td>Dr. Feixing Chen</td>
<td>Beijing Normal University</td>
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<td>11/22/96</td>
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<td>Stochastic Analyses and Simulation of Non-Ergodic Solute Transport in Physically and Chemically Heterogeneous Aquifers</td>
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<td>12/6/96</td>
<td>Dr. Marian Muste</td>
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<td>12/12/96</td>
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<td>University of Adelaide, Australia</td>
<td>Determining the Conveyance of Straight and Meandering Compound Channels</td>
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<td>Connie Mutel</td>
<td>IIHR</td>
<td>Historical Highlights of the IIHR</td>
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<td>1/30/97</td>
<td>Dr. Ching-Long Lin</td>
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<td>The Effect of Surface Roughness on Flow Structure in a Neutrally Stratified Planetary Boundary Layer Flow</td>
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<td>2/7/97</td>
<td>Danesh Tafti</td>
<td>University of Illinois at Urbana-Champaign</td>
<td>Unsteady Incompressible Navier-Stokes Equations - Some Physical, Numerical, Parallel Implementation, and Performance Issues</td>
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<td>Prof. Eric Hoffman</td>
<td>University of Iowa, Medicine and Engineering</td>
<td>Structure-Function Correlates of Air and Blood Flow in the Cardiopulmonary System</td>
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<td>3/7/97</td>
<td>Prof. Marcelo H. Garcia</td>
<td>University of Illinois</td>
<td>Entrainment of Sediment Particles into Suspension by Turbulent Bursting</td>
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<td>Dr. Madhu Sreedhar</td>
<td>IIHR</td>
<td>Non-Linear Turbulence Modeling for Free-Surface Flows</td>
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<td>4/4/97</td>
<td>Dr. Tatsuaki Nakato</td>
<td>IIHR</td>
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<td>4/11/97</td>
<td>Dr. Adnan Alsaffar</td>
<td>Bechtel Corporation</td>
<td>Design Considerations for Cooling Water Intake &amp; Discharge System in Marine Environment</td>
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<td>4/18/97</td>
<td>Prof. Fred Stern</td>
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<td>Dr. Arthur R. Jameson</td>
<td>RJH Scientific, Inc.</td>
<td>Why Use Polarization Radars for Rainfall Measurements?</td>
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<tr>
<td>5/2/97</td>
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<td>Iowa State University</td>
<td>Some Recent Applications of Viscous-Inviscid Interaction Methods</td>
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<tr>
<td>5/9/97</td>
<td>Prof. Wlodek Czernuszenko</td>
<td>Polish Academy of Sciences</td>
<td>The Drift Velocity Concept in Hydraulics of Suspended Sediment</td>
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<td>5/16/97</td>
<td>Prof. Efi Foufoula-Georgiou</td>
<td>St. Anthony Falls Hydraulic Lab</td>
<td>Development of an Efficient Dynamical-Statistical Approach for Predicting Rainfall Over a Large Range of Scales</td>
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<td>Dr. Deepak Kashyap</td>
<td>University of Roorkee, India</td>
<td>Groundwater Development in India</td>
</tr>
</tbody>
</table>
IIHR SENIOR STAFF

Below, Paul, Sr. Accountant  
Bradley, A. Allen, Assistant Professor, Research Engineer  
Chen, L.D., Professor, Chairman, Mechanical Engineering  
** Cherian, M.P., Researcher  
* DeJong, Darian, Engineer I  
* Eichinger, William, Associate Professor, Research Engineer  
Ettema, Robert, Professor, Research Engineer  
** Fujita, Ichiro, Visiting Professor  
Goss, James, Engineer III  
Holly, Forrest M. Jr., Professor, Chairman, Civil and Environmental Engineering, Research Engineer  
Houser, Douglas, Engineer II  
Jain, Subhash C., Professor, Research Engineer  
Janssen, Marlene, Administrative Associate  
Johnson, J. Kent, Assistant Research Scientist  
* Kim, H.T., Visiting Professor  
Krajewski, Witold F., Professor, Research Engineer  
Kruger, Anton, Assistant Research Scientist  
Landweber, Louis, Professor Emeritus  
* Lin, Ching-Long, Assistant Professor, Research Engineer  
* Longo, Joseph, Postdoctoral Associate  
Macagno, Enzo O., Professor Emeritus  
Macagno, Matilde, Scientist Emeritus  
Marshall, Jeffrey S., Associate Professor, Research Engineer  
Matel, Mark, Systems Programmer I  
McDonald, Donald B., Professor Emeritus  
Meselhe, Ehab, Postdoctoral Associate  
* Muste, Marian, Postdoctoral Associate  
Mutel, Cornelia, Program Associate  
Nakato, Tatsuaki, Adjunct Professor, Associate Director, Research Scientist  
* Nielsen, Kevin, Engineer III  
Nixon, Wilfrid A., Associate Professor, Research Engineer  
Odggaard, A. Jacob, Associate Dean, College of Engineering, Professor, Research Engineer  
** Parrish, John, Postdoctoral Associate  
Patel, Virendra C., University of Iowa Foundation Distinguished Professor, Director  
Paterson, Eric, Assistant Research Scientist  
Schnoor, Jerald, Professor, Research Engineer  
** Spasojevic, Miodrag, Postdoctoral Associate  
Sreedhar, Madhu, Postdoctoral Associate  
Stern, Fred, Professor, Research Engineer  
** Tahara, Yusuke, Visiting Professor  
** Tamai, Masahiro, Visiting Professor  
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Wei, Yingchang, Postdoctoral Associate  
Weirich, Frank, Associate Professor of Geography, Adjunct Associate Professor Civil and Environmental Engineering, Research Engineer  
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* Wilson, Robert, Postdoctoral Associate  
** Yabushita, Kazuki, Visiting Professor  
Zhang, D.H., Postdoctoral Associate  
Zhang, You-Kuan, Professor of Geology, Research Engineer  

* Started employment between 7/1/96-6/30/97.  
** Terminated employment between 7/1/96-6/30/97.
** GRADUATE STUDENTS/ASSISTANTS AND FELLOWS **

<table>
<thead>
<tr>
<th>Name</th>
<th>Status/Title</th>
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<tr>
<td>Allen, Mark</td>
<td>Graduate Student</td>
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<td>Anagnostou, Emmanouil</td>
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<td>Ansar, Mathahel Ag Mohamed</td>
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