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, 1998 – June 30, 1999
This report of the activities of the Iowa Institute of Hydraulic Research (IIHR) covers the period July 1998 through June 1999, which coincides with The University of Iowa’s fiscal year. Lists of the active grants, publications, conference presentations, theses and awards of IIHR staff and students are included. Some other highlights and accomplishments of the period are summarized below.

It is interesting to consider that each defined period of an organization’s evolution seems to have its own identity. These reports are issued annually and therefore we look back on the previous year to note what best has identified that period. 1998-99 could be described through recent additions to its staff. Three colleagues from the College of Engineering, K.B. Chandran from Biomedical Engineering and Pedro Alvarez and Keri Hornbuckle from Civil and Environmental Engineering, formally became affiliated with IIHR. Dr. Chandran has expertise in cardiovascular fluid dynamics; Dr. Alvarez’s research focus is in bioremediation of contaminated aquifers, biotransformation and transport of hazardous substances and treatment of contaminated soil, water and wastewater; Dr. Hornbuckle is concerned with the exchange of potentially toxic and persistent organic pollutants across air/water and air/plant interfaces. Additionally, Dr. Yong Lai joined the staff as Associate Research Engineer. He has extensive experience in computational fluid dynamics, turbulence modeling and heat transfer, including engine combustion and cooling, and has been active in diverse projects involving computational modeling. These staff additions bring expertise in widely divergent areas.

New staff reflect areas in which IIHR is broadening its traditional strengths to place increasing emphasis on field measurements in environmental hydraulics and hydrometeorology and on development of computational fluid dynamics (CFD) codes to simulate fluid flows in wide-ranging applications. A number of research studies involved field experiments at sites throughout the U.S. and around the world. CFD is being used in new and exciting ways to simulate flow around complete prototype ships, as well as through power plant turbines and human heart valves and larynxes.

Ongoing efforts in international cooperation and collaborations brought non-degree students from Portugal, Germany, and Italy to IIHR for their thesis research and long-term visitors from France, Switzerland, Russia, Japan, China, Yugoslavia, and Canada to become involved in some phase of IIHR research. IIHR signed a Memorandum of Agreement with the National Center for High-Performance Computing of Taiwan and is pursuing projects under this collaborative effort. Additionally, the second course in International Perspectives in Water Resources Planning was held in Taiwan and Japan in May and June 1999. The course was a tremendous success and featured progress toward goals of participant diversity.

IIHR hosted the 25th American Towing Tank Conference and a meeting of the Resistance Committee of the International Towing Tank Conference. IIHR was selected to host and is busy planning the 4th International Conference on Hydroinformatics, which will be held in Cedar Rapids, Iowa, 23-27 July 2000. It is expected that about 400 participants from around the world will visit IIHR’s laboratories at that time.

IIHR expended a total of $4,271,810 during FY1999 in pursuit of its education and research mission. Of this amount, $2,757,876 was expended for research through grants and contracts proposed and administered by IIHR staff, and $1,340,403 was expended for IIHR’s operation and laboratory and equipment maintenance. The remaining $173,531 was invested by IIHR in its equipment infrastructure. IIHR received an additional $153,561 in equipment-matching funds from the university and college administrations.

The IIHR staff looks forward in 1999-00 to new opportunities that are immanent, as the 1998-99 fiscal year ends, and to the challenges and rewards that these opportunities will present.

V.C. Patel
Director
Grad Student Ahmed Lachhab prepares to launch a weather balloon near Bosque del Apache, New Mexico so that wind velocity and temperature data can be collected.

IIHR’s 3-D sonic anemometer is set up near Davis, California by Grad Student Zhiming Chen to gather data of wind velocity and direction to study turbulence in the atmospheric boundary layer.

IIHR, which deployed its wind lidar, teamed with Los Alamos National Lab, with its Raman lidar, for a study in Wichita, Kansas to measure high-altitude wind in a stable atmospheric boundary layer.

IIHR researchers took field equipment to Kwajalein Atoll in the Pacific to participate in NASA’s Tropical Rainfall Measurement Mission. Here, IIHR’s disdrometer, which measures raindrop size and shape distribution, is placed to gather data from an approaching rainstorm.
## ACTIVE SPONSORED RESEARCH PROJECTS

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<td>** Investigation of Design for Hooked Groin Considered for Placement Near Waukegan Station</td>
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<td>** Lower Granite Dam Surface Bypass and Collection, Numeric Interpolation</td>
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<td>** CIPS Thermal Model for Newton and Coffeen Lakes</td>
<td>CIPS</td>
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<td>Water Quality Study of Coralville Lake</td>
<td>COE(RI)</td>
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<td>Development of Prototype Data Warehouse for Coralville Reservoir</td>
<td>COE(RI)</td>
<td>Weirich</td>
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<td>Three-Dimensional Modelling of Suspended-Sediment Diffusion</td>
<td>COE(WES)</td>
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<td>** Provide Drawings and a Cost Estimate of a Special Design Circulation Flume for Fish Behavior</td>
<td>COE(WES)</td>
<td>Nakato</td>
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<td>CSU/WES</td>
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<td>Aeroacoustic of Voice</td>
<td>DHHS</td>
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* ** Hydraulic Model Study of the South Shore WWTP Headworks Structure for the Milwaukee Metropolitan Sewerage District  
D&A Jain

* Scholar and Multimedia Exchanges in Environmental/Water Resources Engineering and Sciences  
DOE Jain

* Enhancement and Support to PVSTATS Computer Program  
DUP Bradley

** Ott Meter Calibration and Development of Cosine Response Curves  
ENSR Weber

Enhanced Performance and Reliability of Water Intakes for Generating Stations  
EPRI Ettema

* ** Engineering Services by IIHR to Korea  
EPRI Nakato

* Perform Approach Velocity Measurements on Perflow Flow Stack Leaf Filter  
HSC Nielsen

* Use of Abrasives in Winter Maintenance  
IDOT Nixon

* IIHR-IST Portugal Cooperative Research on Water Intakes  
IST Patel

* Circulating-Water Pump-Sump Model Study for the Red Hills Generating Facility  
ITT Nakato

* Model Evaluation of the Iowa Risk Based Corrective Action Tier 3 Groundwater Model  
IUSTP Alvarez, Zhang

Validation of Rainfall Estimates from Space-Borne Radars  
NASA Krajewski

Ground-Based Radar-Rainfall Estimation for the Guam TRMM Validation Site  
NASA Krajewski, Kruger

** Icing of Planar Surfaces  
NASA Ettema

Short Term Quantitative Precipitation Forecasting Using Multi-Sensor Remote Sensing and Eta Model Data Assimilation  
NASA Krajewski

* A Priori Testing of a Subgrid Scale Model in Buoyancy Driven Flow  
NASA Lin

* Vascular Mechanics with Atheroma Progression  
NIH Chandran

Rainfall Estimation Uncertainty Studies in Support of the Surface Reference Data Center  
NOAA Krajewski, Kruger

* Hydroclimatic Coupling in Water Resources Management: An Evaluation Framework  
NOAA Bradley

* Develop a Long-Term Database of the WSR-88D Archive II Radar Data for Performance Evaluation of the PPS Algorithms  
NOAA Krajewski

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<td>NSF</td>
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<td>Fundamental Investigations of Modeling of LES of Atmospheric Boundary Layer Flow Near the Land Atmosphere Interface</td>
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<td>Unsteady Ship Boundary Layers and Wakes</td>
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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>
<td>PUD-GC</td>
<td>Odgaard, Patel, Weber</td>
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<td>Numerical Modeling for Lower Granite Dam Surface Bypass and Collection</td>
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<td>Unstructured Tetrahedron Element Capability for CFD Simulations</td>
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* Unstructured Grid Based Lattice Boltzman Method for Flow Simulations  
   UI  Lin, Lai

* Cooperative Agreement for Middle Rio Grande Evapotranspiration Investigations and Other Related Water Management Studies  
   USBR  Eichinger

Hydraulic Evaluation of Erosion Processes in Rivers Covered with Ice and Fixed Debris  
   USDA  Ettema

* Application of PIV and Numerical Modeling to Coastal Marshes  
   USLA  Muste, Kruger

* Multi-Prong Approach for Teaching and Research  
   USLA  Muste

Abbreviations

Army/UCONN  Army/University of Connecticut
ARO  U.S. Army Research Office
Bechtel  Bechtel
CECo  Commonwealth Edison Company
CGRER  Center for Global and Regional Environmental Research
CH²MH  CH²M Hill Engineers
CIPS  Central Illinois Public Service
COE(OD)  U.S. Army Corps of Engineers, Omaha District
COE(RI)  U.S. Army Corps of Engineers, Rock Island District
COE(WES)  U.S. Army Corps of Engineers, Waterways Experiment Station
COE(WW)  U.S. Army Corps of Engineers, Walla Walla District
CSU  Colorado State University
DHHS  Department of Health and Human Services
D&A  Donohue and Associates
DOE  Department of Education
DUP  DuPage County (DuPage)
ENSR  ENSR Consulting
EPRI  Electric Power Research Institute
HSC  Hendrick Screen Co.
IDOT  Iowa Department of Transportation
IST  Instituto Superior Tecnico (Portugal)
ITT  ITT A-C Custom Pump
IUSTP  Iowa Underground Storage Tank Program
NASA  National Aeronautics and Space Administration
NIH  National Institute of Health
NOAA  National Oceanic and Atmospheric Administration
NSF  National Science Foundation
NYC  New York City
ONR  Office of Naval Research
Parsons  Parsons Engineering Science, Inc.
PUD-CC  Public Utility District No. 1 of Chelan County (Washington)
PUD-GC  Public Utility District of Grant County (Washington)
Sverdrup  Sverdrup Civil, Inc.
SwRI  Southwest Research Institute
UI  University of Iowa
USBR  U.S. Bureau of Reclamation
USDA  U.S. Department of Agriculture
USLA  University of Southwestern Louisiana

JULY 1998 THROUGH JUNE 1999 PUBLICATIONS
Institute of Hydraulic Research
The University of Iowa

IIHR REPORTS


IIHR LIMITED DISTRIBUTION REPORTS


JOURNAL ARTICLES


PAPERS PRESENTED AT CONFERENCES PUBLISHED IN PROCEEDINGS


PRESENTATIONS AT CONFERENCES


DISCUSSIONS


BOOK PUBLICATIONS


BULLETINS

MONOGRAPHS


OTHER


Mutel, C.F. (with L. Pohlman and R. Senter), Script for the Loess Hills State Forest Visitor's Center museum displays, prepared for the Iowa Department of Natural Resources, Forestry Division, Des Moines, Iowa, September 1998.

Mutel, C.F., IOWATCH, Newsletter of the Center for Global and Regional Environmental Research, The University of Iowa, Iowa City, IA, Fall 1998; Annual Report, Spring 1999.


PH.D. THESES ACCEPTED


M.S. THESES ACCEPTED


M.S. WITHOUT THESIS
AWARDS, RECOGNITIONS, EXTERNAL COMMITTEE ASSIGNMENTS  
of IIHR STAFF and STUDENTS  
1998-99

National and International Recognitions

NEW IN 1998-99

**Research Staff**

**Alvarez**
- Member, Panel for National Science Foundation CAREER Awards, 1998.

**Bradley**

**Chandran**
- Visiting Professor, Mayo Clinic and Graduate School, 1998.
- Visiting Professor, Ecole Superieure de Mecanique de Marseille, Marseille, France, 1999.

**Ettema**
- External Reviewer of Micro Modeling for U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi, 1999.

**Holly**
- Best Technical Note Award, Hydraulics Division of American Society of Civil Engineers, 1998.

**Krajewski**
- Invited Short Course at Taiwan Water Resource Bureau in Taipei, Taiwan, 1999.

**Lin**
- NSF Early Faculty Development (CAREER) Award, 1999 - 2003.

**Marshall**
- External Member, VIPAR Program Review Board, Sandia National Laboratory, 1999.

**Nixon**

**Patel**

**Stern**
- Guest Lecturer, ETSIN, Madrid, Spain. 1998.

CARRIED OVER FROM PREVIOUS YEARS

**Research Staff**

**Bradley**
- Member, National Oceanic and Atmospheric Administration GEWEX Continental-Scale International Project Science Panel for Large-Scale Area North-Central, 1996 - 1998.

**Chandran**
- Member, National Institutes of Health Surgery and Bioengineering Charter Study Section, 1996 - 2000.

**Ettema**
- Member, Review Panel for the Center for Computational Hydrosciences and Engineering, Convened by the U.S. Agricultural Research Service National Sedimentation Laboratory, 1998 - 1999.
Holly

Hornbuckle
Liaison, International Joint Commission’s International Air Quality Advisory Board, 1998 - .
NSF Early Faculty Development (CAREER) Award, 1997 - 2001.

Krajewski
Member, National Atmospheric and Space Administration Tropical Rainfall Measuring Mission Science Team, 1993 - .

Nakato
Member, Panel of Experts for the Upper Indravati Hydroelectric Project for the State of Orissa, India and the World Bank, 1993 - .
Member, Board of Consultants for The Upper Mississippi River and Illinois Waterway Cumulative Effect Study for the U.S. Army Corps of Engineers, 1997 -

Nixon

Patel
Member, Executive Committee of National Computational Science Alliance, 1998 - .

Paterson

Stern
Editor, Journal of Marine Sciences and Technology, 1995 - .

Students
Jennifer Holman
NSF Fellow, 1996-99.

C. Bryan Young
NSF Fellow, 1996-99.

Paul Kucera
NASA Fellow, 1997-99.
Offices, Committees, Editorial Boards in National and International Professional Societies; Conference Organizations

NEW IN 1998-99

Research Staff

Alvarez

Bradley
American Geophysical Union
Member, Hydrology Section Publications Committee, 1999 - .
Representative of Hydrology Section on Student Awards Committee, 1998.
Member, Precipitation Conference Planning Committee, 1999 - .

Chandran
Associate Editor, AUTOMEDICA, 1999 - .

Eichinger
Associate Editor, Water Resources Research, American Geophysical Union, 1998 - .

Holly
Member, Editorial Board, Journal of Hydroinformatics, 1999 - .

Muste
Member, International Association of Hydraulic Engineering and Research Hydraulic Instrumentation Section, 1998 - .
Co-chair, American Geophysical Union Fall Meeting, 1998.

Nakato
Chair, American Society of Civil Engineers Hydraulics Division Technical Committee on Hydraulic Measurements and Experimentation, 1998 - 1999.

Nixon
Associate Director, Iowa Section of American Society of Civil Engineers, 1998 - 1999.
Member, Organizing Committee of Transportation Research Board/National Research Council 5th Winter Maintenance Conference to be held Fall 2000, 1998 - .

CARRIED OVER FROM PREVIOUS YEARS

Research Staff

Bradley
American Geophysical Union
Member, Large-Scale Field Experimentation Committee, 1994 - .
Chair, Precipitation Committee, 1995 - 1999.
Member, Hydrology Awards Committee, 1995 - .
Chair, American Society of Civil Engineers Task Committee on Measurement Errors in Hydraulic Engineering, 1995 - 1998.

Ettema
Chair, Committee to Update Manual 25 on Hydraulic Modeling, American Society of Civil Engineers, 1992 - .

Holly
Vice President, International Association of Hydraulic Engineering and Research, 1995 - .

Krajewski
Member, GEWEX Working Group on Radiative Fluxes, 1995 - .
Member, Hydrologic Research Center Board of Directors, 1993 - .
Associate Editor, Advanced Water Resources, 1997 - .
Nixon
Member, American Society of Mechanical Engineers Energy Committee, 1997 - 2003.

Odgaard
Member, National Cooperative Highway Research Program Panel, 1994 - .

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

Paterson
Member, SNAME Propeller Hydrodynamics Panel (H-8), 1997 - .

Stern
Member, Organizing Committee, 7th International Conference on Numerical Ship Hydrodynamics, Nantes, France, 1997 - 1999.
Member, Organizing Committee, American Society of Mechanical Engineers Forum on CFD Codes: Verification, Validation, and Uncertainties, San Francisco, CA, 1997 - 1999.
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

NEW IN 1998-99

Research Staff
Bradley
  Member, College of Engineering Teaching Committee, 1999 - .
  Member, College of Engineering Probation Committee, 1998.
Holly
  Member, University President’s Persistence to Graduation Task Force, 1999 - 2000.
  Member, College of Engineering Staff Issues Committee, 1998 -1999.
Hornbuckle
  University of Iowa Old Gold Summer Fellowship, 1999.
Marshall
  Evalutor, Iowa State Invention Convention, 1999.
Mutel
  Member, Iowa Academy of Science Iowa Science Foundation Committee, 1999 - .
Nixon
  Member, University Faculty Senate, 1999 - .
  Member, College of Engineering Curriculum Committee, 1999 - .
  Coordinator, College of Engineering ABET, 1999 - .
Patel
  Member, University Provost’s Special Group on Multidisciplinary Programs, 1998 - .

Students
Laura Beninati
  University of Iowa Fellow, - 2001.

CARRIED OVER FROM PREVIOUS YEARS

Research Staff
Bradley
  Faculty Delegate to Universities Council on Water Resources, 1994 - .
Ettema
  Member, Engineering Faculty Council, 1997 - .
Marshall
  Chair, Engineering Faculty Council, 1998-99.
Mutel
  Consulting Editor for Natural History, University of Iowa Press, 1994 - .
  Board of Directors, Johnson County Heritage Trust, 1987 - .
  Science Advisory Board, Iowa Chapter of the Nature Conservancy, 1995 - .
  Member, University of Iowa Collections Coalition, 1996 - .
Nixon
  Chair, College of Engineering Ad Hoc Core Curriculum Committee, 1998 - .
  Member, University Study Abroad Scholarship Committee, 1998 - 2001.
Odgaard
  Member, Iowa Highway Research Board, 1993 - .
  Chair, College of Engineering Building Planning Committee, 1995 - .
  Member, College Research Environment Committee, 1993 - .
Patel
  Member, College of Engineering Campaign Steering Committee, 1996 - .
  Member, University International Linkages Committee, 1997 - .
Stern
  Member, College of Engineering Promotion and Tenure Committee, 1998 - 1999.
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<td>Pedro Alvarez</td>
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<td>10/9/98</td>
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<td>Dr. Michael Vannier</td>
<td>Head, UI Dept of Radiology</td>
<td>Navigation in Diagnosis and Therapy</td>
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<td>1/28/99</td>
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<td>UI Dept of Gastroenterology Mathematical Modeling of Motility in the Intestinal Tract</td>
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<td>Dr. A. Kruger</td>
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<td>Dr. Jun Ni</td>
<td>UI Weeg Computing Center UI/ARCS and CIC/NBCSA High Performance Computing Resources</td>
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<td>3/25/99</td>
<td>Dr. Ray M. Hoff</td>
<td>Environment Canada Aerosols and Gases in the Atmosphere: Pathways and Fate of Toxic Organic and Elemental Chemicals in the Environment</td>
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<td>4/1/99</td>
<td>Hugh Coleman</td>
<td>University of Alabama, Huntsville Uncertainty Analysis in Experimental Fluid Dynamics</td>
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<td>4/9/99</td>
<td>Drs. Eric Paterson and Yong Lai</td>
<td>IIHR Role of CFD and HPC in Development of Future Naval Ships</td>
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<td>4/15/99</td>
<td>Dr. N. Provatas</td>
<td>Dept of Mechanical and Industrial Engineering, University of Illinois, Urbana-Champaign Phase Separation and Microstructure Evolution in Liquid Immiscible Metallic Alloys</td>
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<td>4/23/99</td>
<td>Dr. Joe Longo</td>
<td>IIHR Application of PIV to Towing-Tank Experiments</td>
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<td>5/7/99</td>
<td>Walter Neid</td>
<td>U.S. Environmental Protection Agency Underwater Environmental Cleanups</td>
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</table>
IIHR SENIOR STAFF

* Alvarez, Pedro J.J., Professor, Research Engineer
  Below, Paul, Sr. Accountant
  Bradley, A. Allen, Assistant Professor, Research Engineer

* Chandran, Krishnan B., Professor, Research Engineer

** Chen, L.D., Professor, Chairman, Mechanical Engineering

* Ciach, Gregorz, Visiting Associate Professor
  DeJong, Darian, Engineer I
  Eichinger, William, Associate Professor, Research Engineer
  Ettema, Robert, Professor, Research Engineer

* Garapon, Antoine, Postdoctoral Associate

** Goss, James, Engineer III

* Gui, Lichuan, Postdoctoral Associate
  Holly, Forrest M. Jr., Professor, Chairman, Civil and Environmental Engineering, Research Engineer

* Hornbuckle, Keri, Assistant Professor, Research Engineer
  Houser, Douglas, Engineer II
  Jain, Subhash C., Professor, Research Engineer
  Janssen, Marlene, Administrative Associate
  Johnson, J. Kent, Assistant Research Engineer

* Khelifa, Ali, Postdoctoral Fellow

Kim, Hyun Goo, Visiting Researcher
  Krajewski, Witold F., Professor, Research Engineer
  Kruger, Anton, Assistant Research Engineer

* Lachhab, Ahmed, Researcher

* Lai, Yong, Associate Research Engineer

Lin, Ching-Long, Assistant Professor, Research Engineer
  Longo, Joe, Postdoctoral Associate
  Macagno, Enzo O., Professor Emeritus
  Macagno, Matilde, Scientist Emeritus
  Marshall, Jeffrey S., Associate Professor, Research Engineer
  McDonald, Donald B., Professor Emeritus
  Muste, Marian, Postdoctoral Associate
  Mutel, Cornelia, Program Associate
  Nakato, Tatsuaki, Adjunct Professor, Associate Director, Research Engineer
  Nielsen, Kevin, Engineer III
  Nixon, Wilfrid A., Associate Professor, Research Engineer
  Odgaard, A. Jacob, Professor, Associate Dean, College of Engineering, Research Engineer

** Pahlow, Markus, Visiting Scholar
  Patel, Virendra C., University of Iowa Foundation Distinguished Professor, Director
  Paterson, Eric, Assistant Research Engineer

* ** Porte, Fernando, Visiting Scholar
  Schnoor, Jerald, Miller Distinguished Professor, Research Engineer

** Shiotani, Shigeaki, Visitor

* ** Simones, Claus, Visiting Scholar

* Spasojevic, Miodrag, Visiting Associate Professor

Stern, Fred, Professor, Research Engineer

** Tahara, Yusuke, Visiting Assistant Professor

** Vignal, Bertrand, Postdoctoral Associate

Weber, Larry, Assistant Professor, Research Engineer

** Wei, Yingchang, Postdoctoral Associate

*Started employment between 7/1/98-6/30/99.
**Terminated employment between 7/1/98-6/30/99.
Weirich, Frank, Associate Professor of Geography, Adjunct Professor Civil and Environmental Engineering, Research Engineer
Wilson, Mark A., Data Systems Coordinator
Wilson, Robert, Postdoctoral Associate
* Yoon, Byungman, Visiting Associate Professor
Zhang, D.H., Postdoctoral Associate
Zhang, You-Kuan, Professor of Geology, Research Engineer

* Started employment between 7/1/97-6/30/98.
** Terminated employment between 7/1/97-6/30/98.
### GRADUATE STUDENTS/ASSISTANTS AND FELLOWS

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Department</th>
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<tr>
<td>Aker, Brian</td>
<td>Graduate Research Assistant</td>
<td>G.S.</td>
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<td>Azcona, Alejandro</td>
<td>Graduate Student</td>
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<td>Bagherzadeh</td>
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<td>Beniniati, Maria-Laura</td>
<td>University of Iowa Fellow</td>
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<td>Blair Jessica</td>
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<td><strong>Gossler, Al</strong></td>
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<td>Holman, Jennifer</td>
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<td>Kucera, Paul</td>
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<td>Young, C. Bryan</td>
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* Began association with IIHR between 7/1/98-6/30/99.
**Terminated/left between 7/1/98-6/30/99.
Young, Nathan Graduate Research Assistant C.E.E.
* Yu, Kwonkyu Graduate Research Assistant C.E.E.
* Yue, Wusi Graduate Research Assistant M.E.

UNDERGRADUATE FELLOWS

* ** Kuhl, David Undergraduate AASERT Fellow M.E.
* Metcalf, Bryson Undergraduate AASERT Fellow M.E.
** Rose, Rebecca Undergraduate AASERT Fellow M.E.

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