

## Umesh A. Korde

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- Education:**
- Ph. D** University of Notre Dame, USA, Mechanical Engineering, 1993.  
**Research Focus:** Dynamics and Control: Robotics and 3-D vision-based position control.
  - M. Eng.** University of Tokyo, Japan, Naval Architecture and Ocean Engineering, 1988.  
**Research Focus:** Dynamics and Control: Active control of oscillating bodies; wave energy conversion.
  - B. Tech. (Hon.)** Indian Institute of Technology, Kharagpur, India, Naval Architecture and Marine Engr., 1982.  
(2 nd in graduating class of 13).

### 2003 (Aug.) – Present

South Dakota School of Mines and Technology, Rapid City, SD

#### **Positions Held**

July 2008 – Present

Professor, Department of Mechanical Engineering (tenured)

August 2003 – June 2008

Associate Professor, Department of Mechanical Engineering

#### **Teaching**

ME 352- Introduction to Dynamic Systems

ME 423- Mechanical Vibrations

ME 722/ME 692- Smart Structures

ME 692- Control of Flexible Structures

ME 221- Dynamics of Mechanisms

ME 426- Mechanical Systems Lab

ME 683-Advanced Mech. Syst. Control

ME 673- Applied Engr. Analysis I

#### **Research Activities**

Advanced dynamic and control systems, vibrations, smart structures and materials, wave energy conversion

#### **Selected Publications (refereed journals; last 5 years)**

- Korde, UA, 'Large-displacement electrostatic actuation of membrane reflectors through mechanical control of electrode-membrane gap', *J. Intelligent Material Systems and Structures*, accepted for publication, Sept, 2009
- Korde, UA, 'Large-displacement control of variable area electrostatic actuation for membrane reflectors', *J. Intelligent Material Systems and Structures*, Online-First Sept. 18, 2008 (26pp); doi: 10.1177/1045389X08096258
- Korde, UA, Wickersham MA, Carr SG, 'Effect of a negative capacitance circuit on the out-of-plane stiffness and dissipation of piezoelectric membranes', *J. Smart Materials and Structures*, 17 (2008) 035017 (13pp); doi: 10.1088/0964-1726/17/3/035017
- Korde UA, 'Studies on area controlled electrostatic actuation of small membrane reflectors', *J. Intelligent Material Systems and Structures*, Online-First April 21, 2008, (22pp); doi: 10.1177/1045389X07086356
- Jenkins, C.H., and Korde, U.A., "Experimental membrane vibrations: an historical perspective and recent results", *J. Sound and Vibration*, v. 295 (3-5), pp. 602-613, August 2006.
- Korde, U.A., 'Study of a jet-propulsion method for an underwater vehicle', *Ocean Engineering*, v. 31, pp. 1205-1218, 2004
- Korde, U.A., 'Systems of reactively controlled oscillating bodies in wave energy conversion', *Applied Ocean Research*, v. 25, n. 2, pp. 79-91, 2003

#### **Selected Publications (refereed conferences; last 4 years)**

- Robinson LK, Wickersham MA, Korde UA, 'Membrane mirrors with boundary located actuators', *50<sup>th</sup> SDM/AIAA/ASM/ASCE Adaptive Structures Conf*, in review (2 others at this conference)
- Wickersham MA, Downs A, Korde UA, Hofacker ME, Kingsbury NA, 'Membrane Reflectors with Variable Area Electrostatic Actuation for Laser Beam Guidance', presented, *49<sup>th</sup> SDM/16<sup>th</sup> AIAA/ASME/ASCE Adaptive Structures Conf.*, Schaumburg, IL, 2008 (2 others at this conference)

- Korde UA, 'Studies on a submerged flexible sheet type wave energy device with distributed point-wise secondary power conversion', *Proc. 26<sup>th</sup> ASME Offshore Mechanics and Arctic Engineering (OMAE) Symp.*, June 2007
- Korde, U.A., Wickersham M.A., Farke, J.J., Hofacker, M.E., 'Electrostatically actuated small circular membrane reflectors for laser beam guidance', *14<sup>th</sup> AIAA Adaptive Structures Conf.*, April 2007; (one other at this conference).
- Korde, U.A., Petersen E.A., Daugaard, D, 'In-plane vibration of membrane strips and sheets with piezoelectric actuation and sensing', *SPIE Smart Structures/NDE Conf.*, March 2007; (2 others at this conference).
- Korde, U.A., Wickersham, M.A., Carr, S.G., Jenkins, C.H., 'Active control of material damping in piezoelectric membranes', *Proc. 13<sup>th</sup> AIAA Adaptive Structures Conf.*, May 2006 (2 others at this conference)
- Korde, U.A., Jenkins, C.H., 'Studies on small rectangular membranes with actuation along boundary', *Proc. SPIE Smart Structures/NDE Conf.*, San Diego, CA, Feb. 2006 (3 others at this conference)
- Korde, U.A., Langerman, M.A., Hainy, M.E., Zelfer, T.J., Sears, J.W., 'Active control of heat induced deformation in a laser powder deformation process', *Proc. 24<sup>th</sup> Int. Cong. Appl. Lasers and Electro- Optics (ICALEO)*, Laser Institute of America, Oct. 2005
- Korde, U.A., and Jenkins, C.H., 'Lightweight multifunctional actuation systems', *SPIE Smart Structures/NDE Conf.*, San Diego, CA, March 2005.
- Korde U.A., Langerman ML, Buck GA, Kalanovic VD (2004), 'Feedforward laser power specification for uniform cooling of thin-walled parts', *Proc. ASME- IMECE*, Anaheim, CA, Nov. 13-16, 2004.
- Korde, U.A., Jenkins, C.H., Sears, J.W., Husman, M.J., 'Development of a micromotor design for space applications', *Proc. CANEUS 2004 Micro-technology Conf.*, Monterey, CA, 2004
- Pollard, E.L., Korde, U.A., Jenkins, C.H., 'Shape memory alloy microactuators for space applications', *Proc. CANEUS 2004 Micro-technology Conf.*, Monterey, CA, 2004

#### **Selected Research Contracts and Grants**

- PI: "Shielding on Sounding Rockets and Launch Vehicles", Air Force Research Laboratory (AFRL), Kirtland AFB, NM (\$353,000): **Current**
- PI: "Shielding Rocket Payloads in Transient Acoustic Loads", Air Force Research Laboratory (AFRL), Kirtland AFB, NM (\$305,000): **Current**
- PI: "Noise Shielding On Launch Vehicles", AFRL, Kirtland AFB, NM (\$255,000): **Current**
- PI: "Advanced Smart Structures", AFRL, Kirtland AFB, NM (\$329,000): **Current**
- PI: "Self-Repair of Space Structures", AFRL, Kirtland AFB, NM (\$150,000): **Current**
- PI: "Intelligent Passive Damping of Membrane Structures", AFRL, Kirtland AFB, NM (\$200,000): **Current**
- Co-PI: "Model Driven Feedforward Control of Laser Powder Deposition", Army Research Laboratory (\$275,000): **Current**
- Co-PI: "Instrumentation for Advanced Material Characterization", National Science Foundation, Major Research Instrumentation Grant (\$400,000): **Concluded**
- PI: "Advanced High Performance Micromachines", NSF /EPSCoR-State of SD Grant (\$55,000): **Concluded**

#### **Journal Editorships/Professional Committee Memberships**

- Associate Editor: *Ocean Engineering*, international journal, (Elsevier)
- Editorial Advisory Board: *The Open Ocean Engineering Journal* (Bentham Open)
- Scientific Committee Member. Session Organizer, Session Chair: ASME Offshore Mechanics and Arctic Engineering: Renewable Energy Symp. (annual)
- Scientific Committee Member, Session Chair: SPIE Smart Structures and Integrated Systems Conf. (as needed)
- Member: ASME Technical Committee on Model Identification and Intelligent Systems
- Reviewer for: *Ocean Engineering, Simulation and Modeling Practice, IEEE Oceanic Engineering, Measurement Science and Technology, AIAA J. Spacecraft and Rockets, AIAA J. Aircraft, J. Nonlinear Systems, AIAA SDM Conference, etc.*

#### **Service to University**

- Biomedical Engineering MS/PhD Program Coordinator (July 2005-July 2007)
- Mechanical Engineering Transfer Student Advisor
- ME PhD Program Proposal Development

#### **Collaborations**

- External Collaborators (ongoing)  
Dr. Chris Jenkins, Professor, Montana State Univ.                      Dr. Cengiz Ertekin, Professor, Univ. of Hawaii
- Selected Graduate Students Advised (as Major or Co-Major Professor)  
Mr. Subhan Turlapaty (MSME; graduated, 2004)  
Mr. Jacob Koester (MSME; graduated, 2005)  
Mr. Jagadeesh Narayana (MSEE; graduated, 2005)  
Dr. Awlad Hossain (PhD/MES; graduated, 2006)  
Ms. Abiuda Reddy (MSME; graduated, 2007)  
Mr. Miles A. Wickersham (MSME; in progress)  
Mr. Michael Fontaine (MSME; in progress)  
Mr. Tyler Engberg (MSME; in progress)  
Mr. Jeffrey Comrie (MSME; in progress)

#### **Awards and Honors**

Who's Who among America's Teachers 2002, 2004  
Who's Who in Engineering Education, 2004

#### **Society Memberships**

- American Society of Mechanical Engineers (ASME): Member
- American Institute for Aeronautics and Astronautics (AIAA): Member
- Society of Naval Architects and Marine Engineers (SNAME): Member
- American Geophysical Union (AGU): Member

#### **2002 (Aug.) – 2003 (May)**

St. Cloud State University, St. Cloud, MN  
Associate Professor, Mechanical and Manufacturing Engineering Department

#### **Courses Taught**

Dynamics of Machinery [Advanced Dynamics (graduate course)], Machine Control and Robotics (Digital + Continuous Control, PLCs, Robot modeling and control), Engineering Design Graphics (Pro/E based), Computer-Aided Design (Pro/E, Pro/M; FE analysis basic theory), Engineering Mechanics (Statics)

#### **Research Activities**

Advanced Dynamics, Control Systems, Vibrations, Engineering Design, Automation; applications thereof in wave energy conversion, human fall dynamics, jet-propelled underwater vehicle control, etc.

#### **Selected Publications (invited and/or refereed)**

Korde, U.A., 'On controlled oscillating wave energy converters with submerged reaction mass', *Proc. ASME-Offshore Mech. And Arctic Engr. (OMAE) Conf.*, Cancun, Mexico, June 2003  
Korde, U.A., 'Active control applications in wave energy conversion', *Sea Technology*, [invited article](#), July 2002  
Korde, U.A., 'Dynamics of a floating buoy under latching control', *Proc. ASME- Offshore Mech. And Arctic Engr. (OMAE) Conf.*, Oslo, Norway, June 2002

#### **Grants Received**

College of Engineering and Science Research Grant: awarded October 2002

#### **Professional Service**

- Reviewer, Session Organizer for ASME-OMAE 2003 (Offshore Mechanics and Arctic Engineering) Conference (Ocean Engineering Track: Renewable Energy IB)
- Reviewer: Int. J. Engineering Education (Special issue on Manufacturing Engineering Education)

#### **Honors Received**

- Who's Who in America
- Invited observer to the Int. Ship and Offshore Structures Congress (ISSC)-2003

#### **1999 (Jan.) – May 2002**

Indiana Institute of Technology, Fort Wayne, IN.  
Associate Professor and Chair, Mechanical Engineering Department.  
Co-Director, Applied Research Center.

**Courses Taught**

Vibrations, Dynamics, Theory of Machines, Automation, Design for Manufacturing, Computer-Integrated Manufacturing, Engineering Design and Graphics, Senior Project Coordination and Advising, Advisor to mini-Baja, Robotics Challenge teams.

### **Research Activities**

Vibrations, Dynamic Modeling and Control, Engineering Design, and Optimization applications in wave energy conversion.

### **Selected Publications (refereed journals and conferences)**

- Korde, U.A. 'Phase control of floating bodies from an onboard reference', *Applied Ocean Research*, v. 23, n. 5, pp. 251-262, 2001
- Korde, U.A., 'Latching control of wave energy devices from an active reference', *Ocean Engineering*, v. 29, n. 11, pp. 1343-1355, 2001
- Korde, U.A. 'Use of oscillation constraints in providing a reaction on deep-water floating wave energy devices', *Int. J. Offshore and Polar Eng.*, v. 11, n. 2, pp. 155-160, 2001
- Lin, F., Schoen M.P., Korde, U.A., 'Numerical investigation of rub related vibration in rotating machinery', *J. Vibration and Control*, v. 7, n. 6, pp. 833-848, 2001
- Korde, U.A., Schoen, M.P., and Lin, F., 'Strategies for time-domain control of wave energy converters in irregular waves', *Proc. Int. Soc. Offshore and Polar Engr. (ISOPE) Conf.*, Stavanger, Norway, June 2001
- Korde, U.A., 'Control system applications in wave energy conversion', *Proc. MTS/IEEE Oceans 2000*, invited paper, Sept. 2000

### **Administrative Duties**

- Budget management, semester course scheduling, faculty course assignment, full-time and adjunct faculty hiring, program coordination and development, research funding management
- Successfully led the Mechanical Engineering program through an ABET focused visit
- Co-designer of college-wide outcomes assessment procedure
- Led department through preparations for ABET's next general visit

### **Principal Grant Activity**

- National Science Foundation Japan Program; research funding from Japan Society for Promotion of Science: Principal Investigator (PI; funded)
- Consulting Grant from Japan Marine Science and Technology Center (JAMSTEC) (PI; funded)
- Ball Foundation Initiation Grant for Applied Research Center; Joint Project Director (Co-PI; funded)
- Proposal to State of Indiana: (wave-powered protection of underwater intakes from Zebra mussel growth in power plants on the coast of Lake Michigan) with University of Saint Francis, Ft. Wayne, IN; (PI, not funded)
- Proposal to NSF: Collaborative Research Proposal with University of Tokyo, Japan; included international research experience for 6 US undergraduates; (PI; not funded)

### **Honors/Awards Received**

- Engineering Faculty of the Year 2000
- President's Grantsmanship Award, 2000
- Who's Who in Engineering Education
- Who's Who among America's Teachers

### **Other Scholarly Recognition/Activity**

- Reviewer for *J. Vibration and Control*, *Int. J. Offshore and Polar Engineering*, *Int. Conf. Offshore and Polar Engr.*, *Marine Technology Society Journal*

### **1997 (May) -1998 (Dec)**

Japan Marine Science and Technology Center (JAMSTEC), Yokosuka, Japan  
(Public Corporation).  
Invited Research Fellow, Marine Technology Department.

### **Research Activities**

Dynamic Modeling and Control, and Engineering Design applications in wave energy conversion.

### **Selected Publications (refereed journals and conferences, and report for NSF web site)**

- Korde, U.A. 'Hydrodynamics of a tail-tube buoy', *Ocean Engineering*, v. 27, pp. 1473-1484, 2000
- Korde, U.A., 'On providing a reaction for efficient wave energy absorption by floating devices', *Applied Ocean Research*, v. 21, n. 6, pp. 587-599, 1999
- Korde, U.A., Karlsson, P., and Flinkberg, E., 'Use of an on-board motion compensated block to enhance wave-energy conversion by floating devices', *J. JAMSTECR*, v. 38, Oct. 1998
- Korde, U.A., 'Active heave compensation in deep-water drilling and wave-energy conversion', *Proc. ASME Offshore Mechanics and Arctic Engineering Symp.(OMAE-98): Offshore Tech.*, Lisbon, Portugal, July 1998

Pizer, D.J. and Korde, U.A., 'Recent studies on "Mighty Whale" hydrodynamics', *Proc. Third European Wave Energy Conference*, Patras, Greece, Sept. 1998  
Korde, U.A., 'Ocean wave energy conversion projects in Japan', scientific report on NSF (US) and NSF (Tokyo) web sites

### **Courses Taught**

- Co-advisor to 2 Master's students from Chalmers University of Technology, Sweden.
- Co-advisor to 1 Master's student from Univ. of Tokyo and 1 Ph.D. student from Nihon University, Japan.

### **Honors/Awards Received**

- Who's Who in the World
- JAMSTEC Travel Award

### **Other Scholarly Recognition/Activity**

- Reviewer for J. Fluid Mechanics, ASME Offshore Mechanics and Arctic Engineering Conference

### **1996 (May) -1997 (Apr.)**

Independent Researcher, Memphis, TN.

### **Research Activities**

Dynamic Modeling and Control, Engineering Design, Vibrations, and Marine Hydrodynamics applications in wave energy conversion and deep-water drilling.

### **Selected Publications (refereed journals)**

Korde, U.A., 'On efficient primary energy conversion in irregular waves', *Ocean Engineering*, v. 26, pp. 625-651, 1999  
Korde, U.A., 'Active heave compensation on drill-ships in irregular waves', *Ocean Engineering*, v. 25, no. 7, pp. 541-561, 1998  
Korde, U.A., 'Performance of a wave-energy device in shallow-water nonlinear waves: Part II', *Applied Ocean Research*, v. 19, no. 1, pp. 13-20, 1997  
Korde, U.A., 'Performance of a wave-energy device in shallow-water, nonlinear waves: Part I', *Applied Ocean Research*, v. 19, no. 1, pp. 1-12, 1997.

### **Principal Grants Received**

- National Science Foundation, Japan Program: Principal Investigator
- Science and Technology Agency (Japan) Fellowship: Principal Investigator

### **1993 (Aug.) -1996 (May)**

Christian Brothers University, Memphis, TN  
Assistant Professor, Mechanical Engineering

### **Courses Taught**

Engineering Design, Engineering Graphics, Senior Project Advising, Dynamics, Machine Kinematics, Robotics, Manufacturing Processes

### **Research Activities**

Robotics, Engineering Graphics Education, Marine Hydrodynamics and Engineering Design applications in wave energy conversion.

### **Selected Publications**

Gonzalez-Galvan E, Skaar SB, Korde UA, Chen W, 'Application of a precision enhancing technique to 3-D camera-space manipulation', *Int. J. Robotics Research*, v. 16, n. 2, 1998, pp. 240-257  
Korde, U.A., 'Control strategies for oscillating water column wave energy devices', *Proc. Second European Wave Energy Conference*, Lisbon, Portugal, Nov. 1995.  
Korde, U.A., 'Nonlinear dynamics of a system of cooperating robots', *28 th ISATA Robotics, Vision, and Motion Conference*, Stuttgart, Germany, Sept. 1995.  
Korde, U.A., 'On the dynamics of a robotic MIG welding process', *Proc. 5 th RI/SME World Conference on Robotics Research*, Cambridge, MA, September 1994.  
Krupicka, G.L., McGinnis, R.E., Korde, U.A., 'Engineering Graphics at Christian Brothers University', *Proc. SE-ASEE Annual Meeting*, Greensboro, NC, April 1994.

### **Principal Grants:**

- Integrated Manufacturing Laboratory, NSF ILI Program: Co-Project Director
- Society of Manufacturing Engineers Education Foundation Grant: Project Director
- Christian Brothers University Faculty Summer Research Grant: Principal Investigator

### **Awards and Other Accomplishments**

- Japanese Government Research Award for Foreign Specialists, 1996
- Manufacturing Technologist Certification, Society of Manufacturing Engineers

### **1990 (Aug.) - 1993 (Jul.)**

University of Notre Dame, Notre Dame, IN.  
Research Assistant, Aerospace and Mechanical Engineering.

### **Research**

Robotics, Kinetics, Kinematics, Control, Machine Vision, Estimation.

### **Selected Publications**

1. Korde, U.A., *Camera-Space Manipulation Using Natural Visual Information*, Ph.D. thesis, University of Notre Dame, 1993; Advisor: Dr. S.B. Skaar
2. Chen, W.Z., Korde, U.A., Skaar, S.B., 'Position control experiments using vision', *Int. J. Robotics Research*, v. 13, no 4, pp. 199-208, 1994
3. Korde, U.A., Skaar, S.B., Gonzalez, E., 'Three-dimensional camera-space manipulation using servoable cameras', *Proc. Intelligent Robots and Computer Vision, SPIE OE/Tech Conf.*, Boston, MA, 1992.
4. Korde, U.A., Chen, W.Z., Skaar, S.B., 'Three-dimensional rigid-body positioning using camera-space control', *Proc. 29th Annual Allerton conf. on Control, Decision, and Computing*, Allerton, IL, 1991, invited paper.

### **1989 (May) -1990 (Jul.)**

Indian Institute of Technology, Madras, India.  
Senior Project Officer, Ocean Engineering.

### **Research Activities**

Dynamics and Control, and Engineering Design applications in wave energy conversion.

### **Selected Publications (refereed journals)**

- Korde, U.A., 'On the control of wave energy devices in multi-frequency waves', *Applied Ocean Research*, v. 13, no. 3, pp. 132-141, 1991.
- Korde, U.A., 'Study of a wave energy device for possible application in communication and spacecraft propulsion', *Ocean Engineering*, v. 17, no. 6, pp. 587-599, 1990.

### **Other Accomplishments**

Design, construction of a 3-m long "high-tech" wave tank with built-in wavemaker and wave energy absorber

### **1986 (Jan.) -1988 (Sept.)**

University of Tokyo, Japan.  
Ministry of Education (Japan) Graduate Research Fellow, Institute of Industrial Science.

### **Research Activities**

Dynamics and Control, and Engineering Design applications in wave energy conversion.

### **Selected Publications:**

- Korde, U.A., 'Development of a reactive control apparatus for a 2-dimensional oscillating water column wave energy device', *Ocean Engineering*, v. 18, no. 5, pp. 465-483, 1991.
- Korde, U.A., 'A power take-off mechanism for maximizing the performance of an oscillating water column wave energy device', *Applied Ocean Research*, v. 13, no. 2, pp. 75-81, 1991.
- Korde, U.A., Maeda, H., 'OWC type absorbing wavemaker', *Proc. Int. Conf. TECHNO-OCEAN*, Kobe, Japan, 1988.
- Korde, U.A., *Reactive Control of Oscillating Water Column Wave Energy Device*, Master's thesis, University of Tokyo, 1988; Advisor: Dr. Hisaaki Maeda.

### **Other Accomplishments**

- Complete design and construction of sophisticated experimental models and mechanisms using lathes, mills, and other machines.
- Design, fabrication and testing of electronic circuits used in feedback control of mechanisms above.

### **1982 (Jul.) -1985 (Dec.)**

Indian Institute of Technology, Madras, India.  
Senior Scientific Officer, Ocean Engineering.

### **Research Activities**

Engineering Design and Marine Hydrodynamics applications in wave energy conversion.

**Selected Publication**

Raju, V.S., Ravindran, M. and Korde, U.A. 'Studies on the oscillating water column (OWC) wave energy device', *Proc. IEEE Oceans 84*, New York, NY, 1984.

**Grants and Accomplishments:**

- Ministry of Education, Japan "Monbusho" fellowship.
- Design and construction of a 10-m long high-tech "narrow" wave tank.

**1983 (Jul.) -1993 (Oct.)**

Queen's University, Belfast, Northern Ireland and University of Edinburgh, Scotland.  
British Council Fellow.

**Research Activities**

Engineering Design, Marine Hydrodynamics, Electronic Instrumentation.

**Principal Publication**

Korde, U.A., 'Experimental study of linear dampers on J-tube oscillating water column', Research Report, Wave Power Group, Hydraulics Division, Civil Engineering, Queen's University of Belfast, 1983.