

Andrew Davol Ph.D., P.E.

Professor, Mechanical Engineering

California Polytechnic State University, San Luis Obispo, CA

EDUCATION

BSME - California Polytechnic State University, San Luis Obispo	1987
MSME - University of California, San Diego	1993
Ph.D. - Structural Engineering, University of California, San Diego	1998
Dissertation -”Structural Characterization of Concrete Filled Fiber Reinforced Shells”	

CAL POLY STATE UNIVERSITY

Assistant Professor, Mechanical Engineering	1999-2004
Associate Professor, Mechanical Engineering	2004-2006
Professor, Mechanical Engineering	2006-present
Department Chair, Mechanical Engineering	2008-2014
Visiting Professor, University of Navarra	2014-2015

PROFESSIONAL ENGINEERING LICENSE

California Certification # M 32024	January 2002
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AWARDS AND HONORS

Cal Poly State University, Academic Advisor Award	2012
California Faculty Association, Lecturers Council, Outstanding Department Chair	2010
Cal Poly State University, Raytheon Teaching and Research Award	2006
University of California, San Diego, Graduate Student Research Award , Davol, Burgueño, Wernli, Zhao	1997
Civil Engineering Research Foundation, Innovative Concepts Award , Seible, Hegemier, Karbhari, Davol, Burgueño	1996
University of California, San Diego, Department of Applied Mechanics and Engineering Science, Exceptional Teaching Assistant Award	1996
California Polytechnic State University, San Luis Obispo, Magna Cum Laude	1987

PROFESSIONAL EXPERIENCE

Boeing Commercial Aircraft, Structural Design and Analysis

747-400	Floor Structures, Design and Analysis	1987-1990
<ul style="list-style-type: none">• Customized installations for new customer configurations.• Analysis of lightweight built up aluminum shear resistant and diagonal tension beams.• 3-D solid modeling for electronic mock-up and interference checks.		
777	Wing to Body Fairing and main landing gear door	1990-1992
<ul style="list-style-type: none">• Finite element analysis to establish load distribution for aluminum fairing support frames.• Sizing of hybrid fiberglass and carbon sandwich panels for pressure loading.• Sizing of ram air turbine door and support structure.		

777 Door Cutouts

1994

- Finite element modeling to investigate stress concentrations around door cutouts.
- Fatigue analysis of cutout reinforcement structures including edge frames, sills and doublers.
- Planning of strain gage layouts for full scale static and fatigue test articles.
- Correlation of static test data with analytical models.

TEACHING EXPERIENCE

Courses and Laboratories Taught

ME134	Introduction to Mechanical Engineering
ME151	Freshmen Seminar
ME152	Engineering Communication, Lab
ME163	Freshmen Seminar
ME211	Statics
ME212	Dynamics
ME318	Vibrations, Lecture and Lab
ME328	Introduction to Design, Lecture and Lab
ME329	Intermediate Design, Lecture and Lab
ME404	Finite Element Analysis, Lecture & Lab
ME415	Energy Conversion
ME428, 429, 430	Senior Design Project, Lecture and Lab
ME441	Single Track Vehicle Design, Lecture and Lab
ME502	Stress Analysis, Lecture and Lab

New Course Preparation

ME163	Freshmen Seminar
ME404	Finite Element Analysis, Lecture & Lab

Club Participation

Advisor for ASME Human Powered Vehicle Club 2001-2006
2004 ASME Western Challenge Champion
2005 ASME Western Challenge Champion
Engineering World Health
2009 - Present

PROFESSIONAL GROWTH AND DEVELOPMENT

Funded Research Proposals

“Heat Collection Element Glass to Metal Seal Redesign For Solar Power Generation Plant”,
Funded through C3RP October, 2002 for \$22,000.

“Analytical Models for the growth and remodeling of Cartilage”, Submitted in collaboration with
Dr. Steve Klisch to NSF September, 2002. Funded, 3 years at ~\$170,000

“Nonlinear Constitutive Equations for Cartilage Growth Analysis”, Submitted in collaboration
with Dr. Steve Klisch, Funded through C3RP October, 2004 for \$24,000.

“Analytical and Experimental Study of Articular Cartilage Growth In Vitro”, Submitted in collaboration with Dr. Steve Klisch to NSF September, 2005. Funded, 3 years at ~\$240,000

Funded Projects

“Backup Rotor Support System”, Northrop Grumman, Winter 2001 (\$50,000 donation to the Mechanical Engineering Department for rotordynamics).

“Turbine Blade Vibration Testing”, Northrop Grumman, Fall 2002, \$60,000 project in collaboration with Dr. Jim Meager.

Professional Society Membership

ASME, 1999-Present

ASEE, 2005-Present

Invited Presentations

"The Graphics Revolution in Engineering with Application to Solar Concentrator Design, Analysis and Testing", XXV International Conference on Graphics Engineering, San Sebastián, Spain, 2015

PUBLICATIONS

Peer Reviewed Journal Articles

Ficklin T, **Davol A**, Klisch SM. Simulating the growth of articular cartilage explants in a permeation bioreactor to aid in experimental protocol design. *Journal of Biomechanical Engineering*, 131:041008, 2009

Klisch, S. M., Asanbaeva, A., Oungoulian, S. R., Thonar, E. J., Masuda, K., **Davol, A.**, and Sah, R. L., “A Cartilage Growth Mixture Model With Collagen Remodeling: Validation Protocols,” *Journal of Biomechanical Engineering*, 130:031006, 2008.

Davol A, Bingham MS, Sah RL, Klisch SM. A nonlinear finite element model of cartilage growth. *Biomechanics and Modeling in Mechanobiology*, 7:295-307, 2008.

Ficklin T, Thomas G, Barthel JC, Thonar EJ, Masuda K, Asanbaeva A, Chen AC, Sah RL, **Davol A**, Klisch SM. Articular cartilage mechanical and biochemical property relations before and after in vitro growth. *Journal of Biomechanics*, 40:3607-3614, 2007.

Burgueño, **Davol**, Zhao, Seible, and Karbhari, “Flexural Behavior of a Hybrid FRP/Concrete Beam/Slab Bridge Component”, *ACI Structures Journal*, Vol. 101, No. 2, March-April, 2004.

Davol, Burgueño and Seible, “Flexural Behavior of Circular Concrete Filled FRP Shells”, *Journal of Structural Engineering*, Vol. 127, No. 7, July, 2001.

Karbhari, Seible, Burgueño, **Davol**, Wernli, Zhao, “Structural Characterization of Fiber-Reinforced Composite Short- and Medium-Span Bridge Systems”, *Applied Composite Materials*, Vol. 7, 2000.

Conference Abstracts

Thomas GC, Ficklin TP, Barthel JC, Asanbaeva A, Thonar EJ, Masuda K, Chen AC, Sah RL, **Davol A**, Klisch SM. Investigation of cartilage biomechanical properties: dependence on strain, direction, and biochemical composition. *Transactions of the ASME Summer Bioengineering Conference*, 2007.

Oungoulian SR, Chen SS, **Davol A**, Sah RL, Klisch SM. Extended two compartmental swelling stress model and isotropic Cauchy stress equation for articular cartilage proteoglycans. *Transactions of the ASME Summer Bioengineering Conference*, in press, 2007.

Klisch SM, Asanbaeva A, Oungoulian SR, Thonar EJ, Masuda K, **Davol A**, Sah RL. A cartilage growth mixture model with collagen remodeling: validation protocols. *Transactions of the ASME Summer Bioengineering Conference*, in press, 2007.

Ficklin TP, Thomas GC, Asanbaeva A, Chen AC, Sah RL, **Davol A**, Klisch SM. Development of an experimental protocol to measure anisotropic material properties of bovine articular cartilage. *Transactions of the ASME Summer Bioengineering Conference*, 2006.

Klisch SM, Sah RL, **Davol A**. Bimodular-orthotropic-polyconvex strain energy functions for the collagen-proteoglycan solid matrix of articular cartilage. *Transactions of the ASME Summer Bioengineering Conference*, 2006.

Klisch SM, Asanbaeva A, Sah RL, **Davol A**. Theoretical and experimental study of articular cartilage growth. *U.S. National Congress of Theoretical and Applied Mechanics*, 2006.

Klisch SM, Sah RL, **Davol A**. A bimodular theory for finite deformations: comparison of orthotropic second-order and exponential stress constitutive equations for articular cartilage. *International Conference on the Mechanics of Biological Tissue*, 2005.

Davol A, Sah RL, Klisch SM. A cartilage growth finite element model for simulation of in vitro unconfined compression tests. *International Conference on the Mechanics of Biological Tissue*, 2005.

Bingham, MS, **Davol A**, Sah RL, Klisch SM. A nonlinear finite element model of cartilage growth under in vitro dynamic compression. *Transactions of the ASME Summer Bioengineering Conference*, 2005.

Klisch, SM, Asanbaeva A, **Davol A**, Sah RL. Cartilage growth mixture model: finite strain theory, constitutive equations, and boundary-value problem solutions. *Proceedings of the International Plasticity Meeting*, 2005.

Klisch, Asanbaeva, Sah, and, **Davol**, "Cartilage Growth Mixture Model: Finite Strain Theory, Constitutive Equations, and Boundary-Value Problem Solutions", *Conference Abstract, Plasticity Conference, Kauai Hawaii, January, 2005*.

Klisch SM, Holtrichter SE, Sah RL, **Davol A**. A bimodular second order orthotropic stress constitutive equation for cartilage. *Transactions of the ASME: Advances in Bioengineering*, 2004.

Klisch, Holtrichter, Sah, and, **Davol**, “ABimodular Second-Order Orthotropic Stress Constitutive Equation for Cartilage”, *Conference Abstract, 2004 ASME International Mechanical Engineering Congress and R&D Expo, Anaheim, CA, Nov. 13-19, 2004*.

Davol, Burgueño and Seible, “Mechanical Characterization of Concrete Filled Carbon Shell Members”, *Engineering Mechanics: A Force for the 21st Century, ASCE, San Diego, CA, May, 1998*.

Seible, Karbhari, Burgueño, **Davol**, Wernli and Zhao, “Structural Characterization of Fiber-Reinforced Composite Short- and Medium-Span Bridge Systems”, *ECCM, Naples, Italy June, 1998*.

Karbhari, Seible, Burgueño, **Davol**, Wernli and Zhao, “Damage Tolerance and Durability of an Advanced Composite Bridge System”, *1st International Conference on Durability of Composites for Construction, Sherbrook, Canada, August, 1998*.

Burgueño, **Davol** and Seible, “The Carbon Shell System for Modular Bridge Components”, *Second International Conference on Composites in Infrastructure, Tucson, AZ, January, 1998*

Seible, Karbhari, Burgueño, **Davol** and Wernli, “Design Issues With Carbon Fiber Composite Reinforced Concrete Structures”, *FRPRCS-3 Conference, Sapporo, Japan, October, 1997*.

Nagy, Seible, Hegemier, Karbhari, **Davol** and Burgueño, “I-5/Gillman Bridge Concept and Design Evaluation”, *UCSD Report No. ACTT-96/07, 1996*.

Seible, Hegemier, Karbhari, Burgueño and **Davol**, “Shallow Dual Tied Carbon Shell Arch Bridge”, *CERF 1996 Innovation Awards Program, Innovative Concepts Award Entry, University of California, San Diego, December, 1995*.

Seible, Hegemier, Karbhari, **Davol** and Burgueño, “Carbon Shell Space Truss Bridge”, *CERF 1996 Innovation Awards Program, Innovative Concepts Award Entry, University of California, San Diego, December, 1995*.