APPLIED BIOMECHANICS

Curriculum Vitae

Louis Y. Cheng, Ph.D.

Summary

Principal Engineer, specializing in impact injury and human tolerance. Specific expertise in human injury related to vehicles, occupation, and recreation. Additional expertise in accident reconstruction, occupant dynamics, occupant protection, vehicle and specifically heavy truck crashworthiness, crashworthiness of wheelchair restraint systems, and implanted orthopedic devices. Extensive experience in computer modeling in biomechanics including occupant dynamics, head and spine modeling, modeling of radial keratotomy, cell mechanics, as well as analyses of structures in civil and mechanical engineering. Motion and kinetic analysis in clinical, ergonomic and sports settings.

Education

Ph.D. (Structural Engineering and Structural Mechanics, *Emphasis in Biomechanics*), University of California, Berkeley

M.S. (Mechanics and Structures), University of California, Los Angeles

B.S. (Mechanics and Structures), University of California, Los Angeles

A.A. (Engineering), Fullerton College, Fullerton, California

Professional Experience

- Principal Engineer
  Applied BioMechanics, Alameda, California, 1999 – Present
- Founder
  Bioniks, Alameda, California, 2012 – Present
- Lecturer
  School of Public Health
  University of California, Berkeley, California, 1999 – 2005
- Regional Manager of Science and Engineering
  Director of Biomechanics
  FTI / Anamet, Hayward, California, 1997 – 1999
- Senior Managing Engineer

2156 CENTRAL AVENUE
ALAMEDA, CA 94501
TELEPHONE: (510) 747-1947
FACSIMILE: (510) 747-1943

Failure Analysis Associates, Inc., Menlo Park, California, 1987 – 1997

- Consultant
  Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, New Mexico, 1986 – 1987
- Consultant
  Life Chiropractic College West, San Leandro, California, 1985 – 1986
- Research Specialist/Lecturer
  University of California, Berkeley, California, 1983 – 1986
- Structural Engineer,
  Structural Mechanics Associates, San Ramon, California, 1983 – 1984
- Principal Engineer,
  EDS Nuclear, Incorporated, San Francisco, California, 1980 – 1983
- Research Engineer,
  California Research and Technology, Incorporated, Woodland Hills, California, 1977 – 1980

Professional Honors

Departmental Scholar, Engineering Department, University of California, Los Angeles

Men of Distinction, Fullerton College

Alexander Anderson Engineering Fellowship

Professional Associations and Activities

Society of Automotive Engineers

Association for the Advancement of Automotive Medicine

Selected Publications, Reports and Presentations

"Evaluation of DyMESH Wheel Impact in a Rollover Collision." *2013 HVE Forum,* HVE-WP-2013-5, 2013 (with E. Deyerl and M. Cheng).

"Two-Dimensional Collision Simulations of Low-Speed Crash Tests." *Society of Automotive Engineers,* SAE 2013-01-0793, 2013 (with E. Deyerl and J. Gatti).

"SIMON/DyMESH Validation Preview (Oral Presentation Only)." *2012 HVE Forum,* HVE-WP-2012-4 (with E. Deyerl).

"Occupant dynamics simulations in support of litigation using MADYMO." Breakout session: *2011 ARC-CSI Crash Conference,* Las Vegas.

"Computer simulation of steer-induced rollover events via SIMON." *Society of Automotive Engineers*, SAE 2011-01-1122, 2011 (with E. Deyerl and M. Fitch).

"Computer simulation of pavement edge traversal." *Society of Automotive Engineers*, SAE 2009-01-0464, 2009 (with E. Deyerl).

"Deformation at branch points in human cerebral arteries." Poster Presentation at *American Society of Biomechanics Annual Conference*, August 22-25, 2007, Stanford, CA (with J.H. Smith, G.T. Manley, K.L. Monson).

"Computer simulation of staged motorcycle-vehicle collisions using EDSMAC4", *Accident Reconstruction Journal*, Vol. 17(4), July/August 2007 (with E. Deyerl).

"Head exposure levels in pediatric falls." Poster Presentation at *Twenty-Fifth Annual National Neurotrauma Symposium*, July 30-Aug 1, 2007, Kansas City, MO (with K. Monson, C. Sparrey, C. Van Ee, G. Manley).

"Dependence of mechanical behavior of the murine tail disc on regional material properties: a parametric finite element study." *J. Biomech. Eng*., Vol. 127(7), pp. 1158-67, 2005. (with A.H. Hsieh, D.R. Wagner and J.C. Lotz).

"Microstructural validation of a disc finite element model." Poster Presentation at the 2004 Annual Meeting, *International Society for the Study of the Lumbar Spine*, Porto, Portugal, 2004 (with A.H. Hsieh, K.K. Cheng, E.I. Palmer and J.C. Lotz).

"Apoptosis corresponds with disc strain environment during dynamics compression." 50th Annual Meeting, *Orthopaedic Research Society*, San Francisco, California, 2004 (with A.H. Hsieh, A.J.L. Walsh and J.C. Lotz).

"Combinations of magnitude and frequency of dynamic compression alter disc strain environment." Poster Presentation at the 2003 Annual Meeting, *International Society for the Study of the Lumbar Spine*, Vancouver, Canada, 2003 (with A.H. Hsieh, A.J.L. Walsh and J.C. Lotz).

"Joint torque influences torso angle and impact severity during backward falls," Poster Presentation at 49th Annual Meeting, *Orthopaedic Research Society*, New Orleans, Louisiana, 2003. (with K.K. Cheng, S.N. Robinovitch and J.C. Lotz).

"Interaction of human injury and building damage – Oklahoma City bombing injury data analysis," *Blast Injuries Study Group Meeting*, Sponsored by the Oklahoma State Department of Health, Oklahoma City, Oklahoma, 1999 (with E. Hinman).

"Deployment of airbags in traffic accidents: Characteristics and consequences," *41st Annual Proceedings, Association for the Advancement of Automotive Medicine*, Orlando, Florida, November 10, 1997 (with E. Lau and R.M. Ray).

"Analysis of occupant dynamics and injury biomechanics in high speed rear impact," *High Speed Rear Impact TOPTEC*, SAE, Tempe, Arizona, October 1997 (with C. Parenteau and R. Kelkar).

"Alcohol as an injury-aggravating factor," *Conference on Alcohol, Drugs, and Traffic Safety*, France, September 1997 (with A. Donelson, R. Schmidt-Hargrave, K. Kennett, K. Ramachandran and L. Thibault).

"Occupant dynamics in low speed collisions: Crash testing and mathematical modeling," *Low Speed Collision TOPTEC*, SAE, Richmond (Vancouver), B.C., Canada, August 1996 (with R. Kelkar, S.M. Werner, F.P. Bayan and E.S. Deyerl).

"Heavy truck crashworthiness – Case studies of heavy truck accidents involving truck occupant fatality," *Proceedings, 15th International Technical Conference on the Enhanced Safety of Vehicles*, Melbourne, Australia, May, 1996 (with S.M. Werner, T.P. Khatua, R.M. Ray and E.C. Lau).

"Heavy truck crashworthiness – Collision accidents," *Proceedings, 15th International Technical Conference on the Enhanced Safety of Vehicles*, Melbourne, Australia, May, 1996 (with S.M. Werner, D.S. Girvan and T.P. Khatua).

"Heavy truck crashworthiness – 90° rollover accidents," *Proceedings, 15th International Technical Conference on the Enhanced Safety of Vehicles*, Melbourne, Australia, May, 1996 (with D.S. Girvan, S.M. Werner and T.P. Khatua).

"Application of the MADYMO program in heavy truck crashworthiness," *5th International MADYMO Users' Meeting*, Fort Lauderdale, Florida, November 1994 (with D. S. Girvan and T. P. Khatua).

"Use of computer simulations in support of litigation," *5th International MADYMO Users' Meeting*, Fort Lauderdale, Florida, November 1994 (with R. L. Piziali, et al).

"U. S. efforts to improve heavy truck occupant crash protection and reduce aggressivity in frontal truck/car collisions," *Proceedings, 14th International Technical Conference on the Enhanced Safety of Vehicles*, Munich, Germany, May 1994 (with R. M. Clarke et al).

"A mechanical model for radial keratotomy: Towards a predictive capability," *Journal of Biomechanical Engineering*, Vol. 116, pp. 56-61, 1994.

"Wheelchair/occupant securement system (California)," Report No. FTA/DMT CA-08-PB93-140747, 1993 (with S. Werner et al).

"Finite element analysis of diffuse axonal injury," in *Vehicle Crashworthiness and Occupant Protection in Frontal Collisions*, Society of Automotive Engineers, pp. 141-154, February 1990 (with T. A. Khatua, R. L. Piziali, and S. Rifai).

"Vesicle formation in the golgi apparatus," *Journal of Theoretical Biology*, Vol. 141(4), pp. 463-504, 1989 (with G. F. Oster, H-P. H. Moore, and A. S. Perelson).

"ATB simulation of Hybrid III dummy in sled tests," *Society of Automotive Engineers International Congress and Exposition*, Detroit, Michigan, February 1988, Paper #880646 (with R. L. Piziali and T. P. Khatua).

"Deformation analyses in cell and developmental biology: I. Formal Methodology," *Journal of Biomechanical Engineering*, Vol. 109, pp. 10-17, 1987.

"Deformation analyses in cell and developmental biology: II. Mechanical Experiments on Cells," *Journal of Biomechanical Engineering*, Vol. 109, pp. 18-24, 1987.

"Elasticity of the zona pellucida of the mammalian egg," *11th Annual Meeting of the American Society of Biomechanics*, Davis, California, September 1987 (with E. Z. Drobnis and D. F. Katz).

"A consistent formulation for finite element solution of nonlinear frictional contact problems," *Proceedings, Numerical Methods in Engineering: Theory and Applications*, Swansea, Wales, July 1987 (with J. W. Ju and R. L. Taylor).

"The mechanisms and mechanics of archenteron elongation during sea urchin gastrulation," *Developmental Biology*, Vol. 115, pp. 490-501, 1986 (with J. D. Hardin).

"The cortical tractor: A new model for epithelial morphogenesis," *Lecture Notes in Biomathematics*, Berlin, West Germany: Springer-Verlag, 1986 (with J. D. Murray, G. M. Odell, and G. F. Oster).

"Neurulation and the cortical tractor model for epithelial folding," *Journal of Embryology and Experimental Morphogenesis*, Vol. 96, pp. 19-49, 1986 (with A. G. Jacobson, G. M. Odell, and G. F. Oster).

"Applications of mechanics to cell and developmental biology," Report UCB/SESM-86/01, *Ph.D. dissertation*, Department of Civil Engineering, University of California, Berkeley, 1986.

"Cracking in particulate composites due to thermal-mechanical stresses," *International Journal of Fracture*, Vol. 17, pp. 483-491, 1981.

"Optimization of planar frame structures to code requirements," *Master's thesis*, University of California, Los Angeles, 1977.