

**Nicholas H. Yang, Ph.D., P.E.**  
**Engineer**

**Professional Profile**

Dr. Nicholas Yang is an Engineer in Exponent's Biomechanics practice. Dr. Yang's areas of expertise include knee biomechanics, human motion analysis, and finite element analysis. He has experience using finite element models to investigate the human knee and other mechanical systems regarding dynamic stress/strain, impact, and frequency analysis. Dr. Yang also has experience in mechanical testing of composite and alloy materials using non-destructive evaluation techniques to determine the residual mechanical properties of damaged structures.

Prior to joining Exponent, Dr. Yang was a Graduate Research Assistant in the Mechanical and Industrial Engineering Department at Northeastern University. He is currently collaborating with the Musculoskeletal Biomechanics Research Laboratory at the University of Southern California, researching the pathomechanics of patellofemoral joint dysfunction. His research focuses on developing subject specific computational knee models to investigate the role of different biomechanical factors (such as joint geometry, ligament injury, and meniscectomy) on the early development of osteoarthritis. Through his research, Dr. Yang works to identify and evaluate the efficiency of intervention and preventive measures for osteoarthritis and other musculoskeletal disorders of the knee.

**Academic Credentials and Professional Honors**

Ph.D., Mechanical Engineering, Northeastern University, 2009  
M.S., Mechanical Engineering, Northeastern University, 2005  
B.S., Aeronautical and Mechanical Engineering, University of California, Davis, 2003

National Science Foundation GK-12 Fellow, Northeastern University, 2004–2008  
Emery Lillard Memorial Scholarship, U.C. Davis, 2001–2003

**Licenses and Certifications**

Registered Professional Mechanical Engineer, California, #M35894

PC-Crash Course, Compresses Essentials and Expert Skills, MEA Forensic, Laguna Hills, CA,  
April 28–30, 2010

Pedestrian/Bicycle Crash Investigation, Institute of Police Technology and Management,  
Scottsdale, AZ, November 1–5, 2010

Traffic Accident Reconstruction, Northwestern University Center for Public Safety, 2011

## **Publications**

Yang N, Canavan PK, Nayeb-Hashemi H, Najafi B, Vaziri A. Protocol for constructing subject-specific biomechanical models of knee joint. *Computer Methods in Biomechanics and Biomedical Engineering* 2010; 13(5):589–603.

Yang N, Nayeb-Hashemi H, Canavan PK, Vaziri A. Effect of frontal plane tibiofemoral angle on the stress and strain at the knee cartilage during the stance phase of gait. *Journal of Orthopaedic Research* 2010; 28(12):1539–1547.

Yang N, Nayeb-Hashemi H, Canavan PK. The effect of the frontal plane tibiofemoral angle and varus knee moment on the contact stress and strain at the knee cartilage. *Journal of Applied Biomechanics* 2010, 26(4):432–443.

Yang N, Nayeb-Hashemi H, Canavan PK. The combined effect of frontal plane tibiofemoral knee angle and meniscectomy on the cartilage contact stresses and strains. *Annals of Biomedical Engineering* 2009; 37(11):2360–2372.

Yang NH, Nayeb-Hashemi H, Vaziri A. Multiaxial failure models for fiber-reinforced composites. *Journal of ASTM International* 2007; 4(2):1–13.

Yang N, Nayeb-Hashemi H. The effect of solid particle erosion on the mechanical properties and fatigue life of fiber-reinforced composites. *Journal of Composite Materials* 2007; 41(5):559–574.

Yang NH, Nayeb-Hashemi H, Vaziri A. Non-destructive evaluation of erosion damage on E-glass/epoxy composites. *Composites Part A: Applied Science and Manufacturing* 2007; 39(1):56–66.

## **Presentations and Published Abstracts**

Orsi A, Homyk A, Wibby S, Yang NH, Canavan P, Nayeb-Hashemi H. Failure locus of the anterior cruciate ligament at 25 degree knee flexion: 3D finite element analysis. *Proceedings, IMECE 2010, ASME International Mechanical Engineering Congress and Exposition, Vancouver, British Columbia, November 12–18, 2010.*

Ho KY, Yang NH, Farrokhi S, Powers CM. The influence of patella cartilage thickness on patella bone stress in females with and without patellofemoral pain. *2010 Annual American Society of Biomechanics Meeting, Providence, RI, August 2010.*

Yang NH, Ho KY, Farrokhi S, Powers CM. Increase patellofemoral joint stress with internal femoral rotation: A finite element analysis. *2010 Annual American Society of Biomechanics Meeting, Providence, RI, August 2010.*

Yang NH, Tsai L-C, Powers C. Biomechanical analysis of knee cartilage stress for individuals with anterior cruciate ligament reconstruction. Proceedings, ASME Summer Bioengineering Conference, Naples, FL, June 16–19, 2010.

Yang NH, Stepan L, Scher I, Thomas, R. Protective capabilities of a watersports helmet for boom-to-head impacts during sailing. Proceedings, ASME Summer Bioengineering Conference, Naples, FL, June 16–19, 2010.

Orsi A, Homyk A, Wibby S, Yang NH, Nayeb-Hashemi H, Canavan P. Finite element analysis of the knee: Development of a failure locus for the anterior cruciate ligament. Proceedings, ASME Summer Bioengineering Conference, Naples, FL, June 16–19, 2010.

Yang NH, Canavan P, Nayeb-Hashemi H. Combined effect of tibiofemoral alignment and meniscectomy on the contact stresses at the knee: An FEA Investigation. Proceedings, ASME Summer Bioengineering Conference, Lake Tahoe, CA, June 17–21, 2009.

Yang NH, Nayeb-Hashemi H, Canavan P. The effect of the frontal plane tibiofemoral angle on the stress and strain at the knee cartilage during the stance phase of the gait cycle. Proceedings, IMECE 2009, ASME International Mechanical Engineering Congress and Exposition, Lake Buena Vista, FL, November 13–19, 2009.

Yang NH, Nayeb-Hashemi H, Canavan P. Finite element analysis of the knee: The effect of tibiofemoral alignment and weight on the stresses in the knee. Proceedings, ASME Summer Bioengineering Conference, Marco Island, FL, June 25–29, 2008.

Canavan P, Yang NH, Nayeb-Hashemi H. Method to determine the effect of the frontal plane tibiofemoral angle on the Varus-Valgus Moment at the knee during stance and gait. Proceedings, ASME Summer Bioengineering Conference, Marco Island, FL, June 25–29, 2008.

Yang NH, Nayeb-Hashemi H, Canavan P. The effect of the tibiofemoral angle on the stress field at the knee. NSF GK-12 Annual Meeting, Washington, D.C., February 29–March 2, 2008.

Yang NH, Nayeb-Hashemi H, Canavan P. The effect of tibiofemoral angle and body weight on the stress field in the knee joint. Proceedings of IMECE 2007, ASME International Mechanical Engineering Congress and Exposition, Seattle, WA, November 11–15, 2007.

Yang NH, Nayeb-Hashemi H. The effect of solid particle erosion on the mechanical properties and fatigue life of fiber-reinforced composites. Proceedings, IMECE 2006, ASME International Mechanical Engineering Congress and Exposition, Chicago, IL, November 5–10, 2006.

Yang NH, Warner GM, Nayeb-Hashemi H, Olia M. Ground excitation and resonance in liquid filled tanks. Proceedings, IMECE 2006, ASME International Mechanical Engineering Congress and Exposition, Chicago, IL, November 5–10, 2006.

Yang NH, Nayeb-Hashemi H. Evaluation of solid particle erosion on e-glass/epoxy composites using acoustic emission activity. Proceedings, IMECE 2005, ASME International Mechanical Engineering Congress and Exposition, Orlando, FL, November 5–11, 2005.

Yang NH, Nayeb-Hashemi H, Vaziri, A. Multi-axial fatigue damage models of fiber reinforced composites. Proceeding, IMECE 2004, ASME International Mechanical Engineering Congress and Exposition, Anaheim, CA, November 13–19, 2004.

### **Professional Affiliations**

American Society of Biomechanics  
American Society of Mechanical Engineers  
Society of Automotive Engineers