



**Exponent**<sup>®</sup>  
Engineering & Scientific Consulting

## Paul L. Briant, Ph.D., P.E.

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### Professional Profile

Dr. Briant specializes in mechanical engineering analysis, solid mechanics, finite element analysis, biomechanics, and digital image processing. He has applied his expertise to numerous failure and design analyses across a wide array of scales, ranging from medical devices and consumer electronics to large piping systems and automotive components. He has extensive experience in fatigue analysis and finite element analysis of medical devices, and he has assisted numerous medical device companies prepare for FDA submission. In addition, Dr. Briant has served as an expert witness in product liability and intellectual property litigation cases and has given both deposition and trial testimony.

Dr. Briant has performed a wide range of both litigation and non-litigation mechanical engineering failure analyses to understand the root cause of reported issues. His medical device analyses have involved cardiovascular implants, insulin pumps, diagnostic devices, surgical tables, and numerous other products. In addition, he has analyzed vibration induced failures and failures of large systems undergoing dynamic events. He also has experience with digital image processing and has written algorithms for both military and non-military applications.

Prior to joining Exponent, Dr. Briant's research focused on laboratory and numerical analysis of cartilage tissue mechanics, as well as the design and analysis of orthopaedic biomedical devices. He also has experience using lathes, milling machines, and other shop equipment, and participated in the design and fabrication of Washington University's entry to the Formula Society of Automotive Engineers racecar competition.

### Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Stanford University, 2008

M.S., Mechanical Engineering, Stanford University, 2004

B.S., Mechanical Engineering, Washington University in St. Louis, summa cum laude, 2002

Veterans Affairs Pre-Doctoral Associated Health Rehabilitation Research Fellowship, 2006

Stanford Graduate Fellowship, 2002

Antoinette Francis Dames Award, 2002

### Licenses and Certifications

Licensed Professional Engineer, California, #M34711

## Professional Affiliations

American Society of Mechanical Engineers (member)

## Patents

U.S. Patent Application Number 20160259480: Calibration of Haptic Devices (P. Augenbergs, M. Piche, V. Chawda, N. Wells, S. McEuen, C. Wiederhold, J. Harley, W. Westerman, J. Bernstein, B. Degner, P. Briant, T. Wedlick).

## Publications

Adler P, Frei Rudolf, Kimiecik M, Briant P, James B, Liu Chuan. Effects of tube processing on the fatigue life of nitinol. Special Issue: Shape Memory and Superelastic Technologies Conference 2017. Invited Paper. <https://link.springer.com/article/10.1007%2Fs40830-018-0153-4>.

Briant P, Bevill S, Andriacchi T. Cartilage strain distributions are different under the same load in the central and peripheral tibial plateau regions. *Journal of Biomechanical Engineering* 2015.

Bevill S, Briant P, Levenston M, Andriacchi T. Central and peripheral region tibial plateau chondrocytes respond differently to in vitro dynamic compression. *Osteoarthritis and Cartilage* 2010; 17(8):980-987.

Chaudhari A, Briant P, Bevill S, Koo S, Andriacchi T. Knee kinematics, cartilage morphology, and osteoarthritis after ACL injury. *Medicine and Science in Sports and Exercise* 2008 Feb; 40(2):215-222.

Andriacchi T, Briant P, Bevill S, Koo S. Rotational changes at the knee after ACL injury cause cartilage thinning. *Clinical Orthopaedics and Related Research* 2006; 442:39-44.

### Invited Lectures

*Engineering Failure Analysis*, Brown University, November 2018.

### Book Chapters

Wu M, Briant P. The use of finite element analysis in design, life prediction, and failure analysis of biomaterials and medical devices. In: *Degradation of Implant Materials*. Eliaz, Noam (ed), Springer, 2013.

Briant P, Andriacchi T. Joint biomechanics: The role of mechanics in joint pathology. In: *Kelley's Textbook of Rheumatology*, 2007.

### Selected Presentations and Published Abstracts

Briant P, Kimiecik M, James B. Analysis of nitinol wear performance. Shape Memory and Superelastic Technologies Conference, San Diego, CA, May 2017.

Briant P, Kreuzer S, Ochoa J. The Abaqus Living Heart: Comparison to static and dynamic in vivo measurements. ASME Verification and Validation Symposium, May 2016.

Briant P, James B, Easley S, Kennett S, Schaffer J, Kay L. The effect of crimp strain on the fatigue performance of nitinol. Shape Memory and Superelastic Technologies Conference, Chipping Norton, Oxfordshire, UK, May 2015.

Briant P, James B. Sensitivity of calculated strains in nitinol to geometric, material, and load variations. ASME Verification and Validation Symposium, May 2014.

Briant P, Lieberman S, James B. Residual stress distribution in MP35N due to plastic deformation and comparison to finite element analysis. International Medical Device Conference and Expo, Chicago, IL, October 2011.

Briant P, Siskey R, Rau A, Easley S, James B. Effect of strain rate on nitinol constitutive modeling in the clinically relevant strain range. ASM Materials and Processes for Medical Devices, Minneapolis, MN, August 2011.

Briant P, Bevill S, Andriacchi T. Quantifying variations in collagen matrix deformation in loaded articular cartilage. ASME Summer Bioengineering Conference, Keystone, CO, June 2007.

Bevill S, Briant P, Andriacchi T. Numerical and experimental analysis of articular chondrocyte deformation: Calibration of multiscale finite element model. ASME Summer Bioengineering Conference, Keystone, CO, June 2007.

Briant P, Rylander J, Bevill S, Andriacchi T. Effects of altered loading on collagen matrix deformation in articular cartilage. 53rd Annual Meeting of the Orthopaedic Research Society, San Diego, CA, February 2007.

Bevill S, Briant P, Andriacchi T. Regional variations in chondrocyte morphology as a cause for cartilage degeneration following kinematic changes to normal joint function. 53rd Annual Meeting of the Orthopaedic Research Society, San Diego, CA, February 2007.

Briant P, Bevill S, Torzilli P, Andriacchi T. Collagen organization in the superficial layer of articular cartilage relative to the mechanical environment within the joint. ASME Summer Bioengineering Conference, Amelia Island, FL, June 2006.

Briant P, Bevill S, Koo S, Andriacchi T. A potential mechanism for the initiation of osteoarthritis at the knee following ACL injury. ASME Summer Bioengineering Conference, Vail, CO, June 2005.