



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

## John Harmon, Ph.D.

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### Professional Profile

Dr. Harmon specializes in investigating the performance and reliability of mechanical equipment and complex machinery with applications spanning the energy, aerospace, construction, mining, and consumer products industries. With specific expertise in solid mechanics and structural dynamics, Dr. Harmon often utilizes finite element analysis (FEA), multi-body simulation techniques, and physical testing to assist with these multi-faceted investigations.

Dr. Harmon has assisted clients with investigations requiring the analysis of critical workplace safety requirements such as machine guarding and lockout/tagout regulations, as well as performing analyses of both OSHA and industry-promulgated standards to identify relevant standards of care for manufacturers, employers, and equipment users. Through these investigations Dr. Harmon has experience with the evaluation of a variety of industrial equipment, including forklifts, conveyors, elevators/escalators, excavators, horizontal directional drills (HDD) and other heavy machinery. Dr. Harmon's consumer product work includes targeted testing and analysis of products, product performance evaluation, failure analysis, and engineering analyses in the context of product safety, compliance, and recall investigations.

During his Ph.D. studies at Caltech, Dr. Harmon conducted research in the transport, breakage, machine trafficability, stability and flow of granular material such as rock, ore, ice and powders with portions of this work carried out in collaboration with NASA JPL and Rio Tinto. Using this background, he offers technical expertise applicable to operations such as crushers, mills, mixers, powder processing, crawlers and slurry transport, with the ability to assess performance, design, and operational issues.

Prior to joining Exponent, Dr. Harmon also accrued over seven years of experience in the energy storage industry. He has particular experience in developing the use of various vertical transportation and material transport systems for the use of mechanically stored energy and energy recovery. He was involved in the design, testing and construction of custom hoists, gondolas, automated guided vehicles, water tanks and pumps for energy storage using both solid and liquid mediums. He has also supported the integration and installation of grid-scale Li-ion battery systems, contributing through mechanical component analysis, construction support, and value engineering.

Dr. Harmon has also enjoyed being a licensed private pilot for over a decade.

### Academic Credentials & Professional Honors

Ph.D., Applied Mechanics, California Institute of Technology (Caltech), 2022

B.S., Aerospace Engineering, University of Texas, Austin, 2016

NASA Space Technology Research Fellow, 2019-2021

## Academic Appointments

Teaching Assistant, Mechanics of Structures and Solids, Caltech, 2019

## Prior Experience

Structural Analyst Engineer, Energy Vault, 2021-2024

Structural Dynamics Consultant, Independent (Contract from Energy Vault), 2017-2021

## Professional Affiliations

American Society of Mechanical Engineers (ASME)

ASTM D18.24 Powders and Bulk Solids (voting member)

## Publications

J.M. Harmon, D. Datta, E. Kennedy. Review of Powered Conveyor Systems Risk and Safety. IMECE 2025. 2025.

D. Seo, J.M. Harmon, J.E. Andrade, G. Buscarnera. DEM Simulation of the Compression of Crushable Sand: Does the Initial Particle Shape Matter? Geotechnique Letters. 2024.

J. Ulloa, Z. Zhou, J.M. Harmon, J.E. Andrade. Cyclic-Loading Effects in Sand: A Micromechanical Study Considering Particle Breakage. Granular Matter. 2024.

A. Rodriguez, J. Restrepo, J. Conte, J. Andrade, A. Rosakis, V. Gabuchian, J.M. Harmon, A. Nema, A. Pedretti. Seismic-Response Assessment of Multiblock Tower Structures for Energy Storage: 1/25 Scale. Journal of Structural Engineering. 2024.

J.M. Harmon, M.L. Cable, S.J. Moreland J.E. Andrade. Predicting the Effect of Surface Properties on Enceladus for Landing. The Planetary Science Journal. 2023.

J.M. Harmon, V. Gabuchian, A. Rosakis, J. Conte, J. Restrepo, A. Rodriguez, A. Nema, A. Pedretti, J. Andrade. Predicting the Seismic Behavior of Multiblock Tower Structures using the Level Set Discrete Element Method. Earthquake Engineering & Structural Dynamics. 2023.

J.E. Andrade, A.J. Rosakis, J.P. Conte, J.I. Restrepo, V. Gabuchian, J.M. Harmon, A. Rodriguez, A. Nema, A.R. Pedretti. A Framework to Assess the Seismic Performance of Multiblock Tower Structures as Gravity Energy Storage Systems. Journal of Engineering Mechanics. 2023.

J.M. Harmon, D. Seo, G. Buscarnera, J.E. Andrade. Insight into Contact Forces in Crushable Sand using Experiments and Predictive Particle-Scale Modeling. Geotechnique. 2022.

A.J. Rosakis, J.E. Andrade, V. Gabuchian, J.M. Harmon, J.P. Conte, J.I. Restrepo, A. Rodriguez, A. Nema, A.R. Pedretti. Implications of Buckingham's Pi Theorem to the Study of Similitude in Discrete Structures: Introduction of the  $R^N_F$ ,  $\mu^N$  and the  $S^N$  Dimensionless Numbers and the Concept of Structural Speed. ASME. Journal of Applied Mechanics. 2021.

J.M. Harmon, K. Karappiperis, L. Li, S. Moreland, J.E. Andrade. Modeling Connected Granular Media: Particle Bonding within the Level Set Discrete Element Method. Computer Methods in Applied Mechanics and Engineering. 2021.

K. Karappiperis, J.M. Harmon, E. Ando, C. Viggiani, J.E. Andrade. Investigating the incremental behavior of granular materials by in silico experiments. Journal of the Mechanics and Physics of Solids. 2020.

J.M. Harmon, D. Arthur, J.E. Andrade. Level Set Splitting in DEM for Modeling Breakage Mechanics. Computer Methods in Applied Mechanics and Engineering. 2020.