James L. Beck

I am the George W. Housner Professor of Engineering and Applied Science, Emeritus, at the California Institute of Technology where I joined the faculty in 1981. I am in two departments in the Division of Engineering and Applied Science: Computing and Mathematical Sciences, and Mechanical and Civil Engineering. I have a Ph.D. in Civil Engineering from Caltech and BSc and MSc degrees in Mathematics from the University of Auckland in New Zealand.

I have nearly 400 technical publications covering topics in convection in porous media, earthquake engineering, structural dynamics, system identification, structural health monitoring, structural control, design optimization, seismic risk and loss estimation, system reliability, Bayesian updating of dynamic models, seismic source inversions, earthquake early warning systems and quantum mechanics. I use a Bayesian probability framework for quantifying uncertainty, such as modeling uncertainty and excitation uncertainty for predicting the response of dynamic systems. This framework gives a rigorous interpretation of probability as a multi-valued conditional logic for quantitative plausible reasoning.

I was awarded the Senior Research Prize in Computational Stochastic Mechanics in Rome in 2005 by the International Association of Structural Safety and Reliability, and the Senior Research Prize in Computational Structural Dynamics of the European Association of Structural Dynamics in Southampton, UK, in 2008. I received the George W. Housner Medal for Structural Control and Monitoring in 2017 and the Masanobu Shinozuka Medal for Stochastic Mechanics in 2019, both from EMI (Engineering Mechanics Institute) of ASCE (American Society of Civil Engineers). In 2022, I was inducted as a Distinguished Member of ASCE. I am also a Fellow of EMI. A special issue of Structural Safety was published in October 2010 to honor me on my 60th birthday. I received the Hojjat Adeli Award for Innovation in Computing for co-authoring the best paper in Computer-Aided Civil and Infrastructure Engineering Journal for 2010.

I served as an Associate Editor of the Journal of Engineering Mechanics and organized a special issue of this journal in January 2004 that reported studies of the IASC-ASCE Structural Health Monitoring Benchmarks. I have been a Co-Guest Editor for multiple special issues of Computer-Aided Civil and Infrastructure Engineering Journal on Structural Health Monitoring and on Computational Intelligence in Structural Engineering and Mechanics. I have also been a Co-Guest Editor for special issues on Earthquake Engineering Applications of Structural Health Monitoring in the International Journal of Earthquake Engineering and Structural Dynamics, and Uncertainty Quantification and Propagation in Structural Systems in the Journal of Risk and Uncertainty in Engineering Systems.

From 1995 to 1999, I was on the Board of Directors of the Consortium of Universities for Research in Earthquake Engineering, including officer positions of Vice-President, President and Past-President. From 2007 to 2011, I served on the Board of Governors of the ASCE Engineering Mechanics Institute, including as Vice President. I served as Chair of the ASCE EMD Dynamics Committee, as a Control Member of its Probabilistic Methods Committee and as the founding Chair of the ASCE Task Group on Structural Health Monitoring, which established a series of benchmarks on this topic. I was a member of the Board of Directors of the International Association of Structural Control and Monitoring from 2010 until 2018. I was also the Chair of the International Association of Structural Safety and Reliability Committee on System Identification and Structural Control.

Before retiring, I taught graduate classes at Caltech on linear algebra and applied operator theory, nonlinear ordinary differential equations, partial differential equations and calculus of variations, and stochastic system analysis and Bayesian updating. In 1997, I was awarded the Caltech Graduate Student Council Award for Excellence in Teaching.