

James L. Beck

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Jim Beck is the George W. Housner Professor of Engineering and Applied Science at Caltech where he has been on the faculty since 1981. He is in two departments in the Division of Engineering and Applied Science: Computing and Mathematical Sciences, and Mechanical and Civil Engineering. He served as Executive Officer (Chair) for Applied Mechanics and Civil Engineering from 1993 to 1998. He has a Ph.D. in Civil Engineering from Caltech and BSc and MSc degrees in Mathematics from the University of Auckland in New Zealand.

Beck has served on many professional society committees. From 1995 to 1999 he 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. He is a member of the Board of Governors of the ASCE Engineering Mechanics Institute. He is a former Chair of the ASCE EMD Dynamics Committee, a former Control Member of its Probabilistic Methods Committee and he was the founding Chair of the ASCE Task Group on Structural Health Monitoring, which established a series of benchmarks on this topic. He is the Chair of the International Association of Structural Safety and Reliability (IASSAR) Committee on System Identification and Structural Control, and a member of the Committee on Computational Stochastic Mechanics. He is a member of the Board of Directors of the International Association of Structural Control and Monitoring.

Beck was awarded the IASSAR Senior Research Prize in Computational Stochastic Mechanics in Rome in June 2005 and the Senior Research Prize in Computational Structural Dynamics of the European Association of Structural Dynamics in Southampton, UK, in July 2008. A special issue of Structural Safety was published in October 2010 to honor him on his 60th birthday. He is on the Editorial Board of several international journals and he served as an Associate Editor of the Journal of Engineering Mechanics for three years. He organized the January 2004 issue of the Journal of Engineering Mechanics which focuses on studies of the ASCE Structural Health Monitoring Benchmarks. He also served as a Guest Editor for three special issues for the journal Computer-Aided Civil and Infrastructure Engineering: structural health monitoring issues published in April 2006 and 2008, and an issue on computational intelligence in structural engineering and mechanics that was published in July 2010.

In recent years, Beck has 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, he was awarded the Graduate Student Council Award for Excellence in Teaching.

Research Interests

Beck's research career in earthquake engineering, structural dynamics and system analysis, identification and control spans more than 35 years. He has over 300 technical publications in these areas covering topics in system identification, structural health monitoring, structural control, design optimization, seismic risk with loss estimation, system reliability, probability logic, Bayesian updating, and stochastic system analysis. A major characteristic of his research is an explicit treatment of uncertainty in modeling of systems, in addition to uncertainty in modeling its future excitation. For this purpose a rigorous framework is used that is based on probability as a multi-valued conditional logic for quantitative plausible reasoning.