MODELING THE STRUCTURE AND FUNCTION OF HUMAN JOINTS: SNAPSHOTS OF THE KNEE, SHOULDER, AND SPINE

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Biomechanical computer modelling has risen to new heights in recent years, mainly because of the belief that this approach can yield new insights into how musculoskeletal function can be altered by injury and disease. Recent advances in imaging technology, numerical modelling techniques and computing power have enabled elaborate models of the body to be built for the purpose of studying tissue function *in vivo*. Three examples are provided here. A model of the lower limb is used to calculate and explain ligament and articular joint surface loading at the knee during walking; a model of the upper limb is used to describe changes in shoulder muscle function after joint replacement surgery; and a model of the cervical spine is used to predict and explain the site of neck injury during whiplash.

About the Speaker

Marcus Pandy is appointed as Chair of Mechanical and Biomedical Engineering at the University of Melbourne and also serves as Head of the Department of Mechanical and Manufacturing Engineering. Dr. Pandy received a Ph.D. in mechanical engineering from Ohio State University in Columbus (1987). He then completed a two-year post-doctoral fellowship in the Department of Mechanical Engineering at Stanford University. In 1990, he was appointed as an Assistant Professor at the University of Texas at Austin. He was promoted to Associate Professor in 1995 and to full professor in 2002. In 2002, he was appointed as the Joe J. King Professor in the Department of Biomedical Engineering at the University of Texas at Austin. He is a Fellow of the American Institute of Medical and Biological Engineering and a Fellow of the American Society of Mechanical Engineers.

Dr. Pandy's research interests are in biomechanics and control of human movement. Much of his research is aimed at using computer models of the human body to study muscle, ligament, and joint function in the normal, injured, and diseased states. He has published nearly 200 scientific papers on this topic. He currently serves as a Chief Investigator on a number of research grants, including a 5-year Fellowship from the Victorian State Government to support research on the development of advanced patient-specific computer models of the human body; and a 5-year multi-institutional research grant funded by the NHMRC to support a new Centre for Clinical Research Excellence in Gait Analysis and Gait Rehabilitation.