Title: “Force-Based Frame Finite Elements: Beyond Deterministic, Small Deformation Response”

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Abstract

Force-based frame finite elements have been shown to be superior to their displacement-based counterparts for simulating the small deformation, material nonlinear response of structural frame members. While minor modifications of the force-based formulation have been proposed by several researchers, two significant extensions of the formulation have focused on the direct differentiation method and large deformation analysis. The former extension allows force-based elements to be used in gradient-based applications where physical properties of the structural system are considered to be uncertain parameters, and the latter allows the well-known computational advantages of these elements to carry over in to simulations of large strain response due to extreme loading. An overview of force-based elements and recently completed research on their extension to uncertainty analysis of large deformation response will be presented along with numerical examples.

Bio

Prof. Michael H. Scott is an Associate Professor of Structural Engineering at Oregon State University (OSU). He completed his B.S. in Civil Engineering at North Carolina State University in 1998 then went on to obtain his Ph.D. in Structural Engineering at the University of California, Berkeley in 2004 and joined the faculty at OSU later that year. Prof. Scott is a core developer of the OpenSees software framework for nonlinear finite element analysis, which reflects his teaching and research interests in nonlinear structural analysis, numerical methods, computer-aided engineering, and response sensitivity analysis. In 2009, he received an NSF CAREER award and was awarded the ASCE Croes Medal. Prof. Scott was also recognized in 2009 as an Outstanding Reviewer for the ASCE Journal of Structural Engineering. After joining the journal's Editorial Board in 2010, Prof. Scott received the ASCE Associate Editor Award in 2011.