

Structural Engineering 2050: How Academia Can Shape the Future

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Abstract

Structural engineering practice is governed by the available tools for analysis and design. It currently relies on linear elastic analysis tools to determine the distribution of demands in structures and then building codes-of-practice in an effort to ensure that all parts of a structure have adequate strength. This approach does not enable engineers to adequately design for performance under service load levels or overloads, it does not encourage the use of new materials and design concepts, and it suffers from the many and varied shortcomings of codes-of-practice.

Within the digital era of Building Information Modeling, structural engineering practice would be transformed by the creation of computational tools that could predict the full inelastic response of structural systems with defined levels of accuracy for all aspects of performance. Academia is best positioned to lead this transformation, but this will require changes in how research is conducted, how students are taught, and how codes-of-practice are developed. This presentation will focus on the activities of the author, the US research community, and the American Concrete Institute to support the creation and use of transformative computational tools.

Biographical Note about Speaker

Dan Kuchma received his PhD from the University of Toronto working under the direction of Michael Collins on the behavior of cracked structural concrete. He joined the faculty at the University of Illinois in 1997 where he is currently an Associate Professor. He is the chair of committee 445 on Shear and Torsion of the American Concrete Institute, a consultant to the US Concrete Bridge Specifications committee, and is also active in the International Concrete Federation and the US Network for Earthquake Engineering Simulation. His research interests are in all things concrete, advanced testing methods, numerical modeling, model validation, networked databases, and sustainability.