

Sense and Sensibility: Challenges in Structural Engineering

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Abstract—Complex and uncertain nature of a structure, the disturbances it is subjected to, and how the structure responds to a given disturbance often limit the use of large-scale computational tools to estimate the true state of the structure at any given time. It is also a challenge to estimate the true range of events a structure might experience during its lifetime and which could cause severe damage or collapse. In some cases, a single process which is part of the complex interactions can dominate the overall behavior of the structure. In such cases, an estimate of the state of the structure can be made with high confidence. In some other cases where the overall behavior of the structure is sensitive to several parameters each with uncertain nature, the state of structure is difficult to estimate particularly when collapse could be triggered. Yet in other cases, data obtained by sensors monitoring the structure and the disturbances could be used together with parametric or simplified numerical models to estimate the state of the structure with some quantifiable level of confidence. Examples from the various cases will be presented to illustrate and discuss some of the challenges faced in structural engineering.

Keywords- structural engineering, uncertainty, complexity, damage, collapse, modeling, instrumentation, data

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About the speaker



Ayhan Irfanoglu is an Associate Professor in the Lyles School of Civil Engineering at Purdue University in West Lafayette, Indiana, USA. He specializes in structural engineering with focus on earthquake engineering, vibrations, engineering seismology, structural analysis and simulation. Dr. Irfanoglu and graduate researchers collaborating

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