LEHIGH UNIVERSITY

P. C. ROSSIN COLLEGE OF ENGINEERING AND APPLIED SCIENCE

2013

FAZLUR RAHMAN KHAN DISTINGUISHED LECTURE SERIES

Honoring a legacy in structural engineering and architecture

Presentations will be held in the Sinclair Laboratory Auditorium at Lehigh University

Receptions to precede events starting at 4:10 P.M.

http://www.lehigh.edu/~infrk

Friday, February 15, 2013
4:30 P.M.
"The Evolution of the Skyscraper"

Friday, March 22, 2013
4:30 P.M.
"Observations on AASHTO Bridge Design"

Friday, April 19, 2013
4:30 P.M.
"Minimizing the Effects of Uncertainties in Developing Reliability-Based Design Criteria"

About the Khan Series

In step with the abounding vitality of the time, structural engineer **Fazlur Rahman Khan** (1929-1982) ushered in a renaissance in skyscraper construction during the second half of the 20th century. Fazlur Khan was a pragmatic visionary: the series of progressive ideas that he brought forth for efficient high-rise construction in the 1960s and '70s were validated in his own work, notably his efficient designs for Chicago's 100-story John Hancock Center and 110-story Sears Tower -- the tallest building in the United States since its completion in 1974.

Fazlur Rahman Khan

Lehigh endowed a chair in structural engineering and architecture and has established this lecture series in Khan's honor. It is organized by **Professor Dan M. Frangopol**, the university's first holder of the Fazlur Rahman Khan Endowed Chair of Structural Engineering and Architecture, and sponsored by the Departments of Civil & Environmental Engineering, and Art, Architecture & Design.

R. Shankar Nair
Senior Vice President exp US Services Inc., and Past Chairman CTBUH, Chicago, IL

The Evolution of the Skyscraper

The presentation will outline the history of the skyscraper — the invention of the safe passenger elevator, which made tall buildings usable; the invention of the metal-framed structure, which made them economical; the rapid increase in height from the 10-story Home Insurance Building in 1885 to the 102-story Empire State Building just 46 years later; the stagnation in height for many years even as structural materials and techniques improved rapidly; the present surge in super-tall buildings; and trends for the future. All of these developments will be explored with a particular emphasis on the fundamental engineering principles driving the evolution of these structures. Though presented primarily from a structural engineering perspective, the presentation should be accessible to anyone interested in tall buildings.

John M. Kulicki
Chairman/CEO Modjeski and Masters Inc., Mechanicsburg, PA

Observations on AASHTO Bridge Design

The bridge design specifications promulgated by the American Association of State Highway and Transportation Officials (AASHTO) is the primary source of technical guidance for highway bridge designers in the United States. The various states may make exceptions to these provisions and the basic document has been the basis of national specifications in many other countries. This presentation will discuss the pre-AASHTO years from the late 1800's until the early 1900's, review the design philosophies utilized by AASHTO to provide structural safety, illustrate how lessons from failures have been incorporated in the design requirements, summarize the development of the latest generation of the specifications, and introduce two potential new directions to make the specifications even more robust and comprehensive. Bridges are a highly visible part of the built environment. In addition to safely transporting drivers over obstacles, the appearance of well-proportioned bridges can add to the view shed and capture the spirit of the public. Some illustrative examples will be presented and the role of design professionals other than engineers will be discussed based on personal observations from recent projects.

Alfredo H-S. Ang
Research Professor, University of California, Irvine, CA

Minimizing the Effects of Uncertainties in Developing Reliability-Based Design Criteria

Uncertainties are unavoidable in the analysis and design of engineering systems. Traditionally, engineers had to contend and dealt with significant uncertainties through conservative assumptions and applied safety factors to cover the effects of the underlying uncertainties. These assumptions and safety factors are invariably determined on the basis of engineering judgments; as such, the level of conservativeness is difficult to quantify. Proposed is a more scientific approach to handle uncertainties and to provide a systematic method to quantify and analyze their effects – namely, the reliability-based approach. The emphasis is to minimize the effects of uncertainties in the development of practical criteria for the design of infrastructure systems, including the formulation of safety factors and/or load/resistance factors in LRFD consistent with the corresponding level of uncertainties. Examples of real structures will be illustrated, including the optimal design based on minimum life-cycle cost.

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This lecture series is sponsored by:
Civil & Environmental Engineering: College of Engineering & Applied Science
Art, Architecture & Design: College of Arts & Sciences