Alfredo H-S. Ang

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.

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ATLSS

Spring 2013 Khan Distinguished Lecture Series

The Fazlur Rahman Khan Distinguished Lecture Series honors Dr. Fazlur Rahman Khan's legacy of excellence in structural engineering and architecture

***Initiated and Organized by* PROFESSOR DAN M. FRANGOPOL**

The Fazlur Rahman Khan Endowed Chair of Structural Engineering and Architecture
Department of Civil and Environmental Engineering, ATLSS Engineering Research Center, Lehigh University
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Alfredo H-S. Ang

Research Professor, University of California, Irvine, CA

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

Friday, April 19th, 2013 – 4:10 pm

Location: Sinclair Lab Auditorium, Lehigh University, 7 Asa Drive, Bethlehem, PA

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

Alfredo H-S. Ang, Research Professor, University of California, Irvine, CA: Dr. Ang is currently Research Professor and Professor Emeritus at the University of California in Irvine, California, USA. He is also Professor Emeritus at the University of Illinois at Urbana-Champaign since 1988 where he received his Ph.D. in 1959 and was on the faculty of Civil Engineering from 1959 through 1988. His main area of research is on the application of probability and reliability in civil and structural engineering, with emphasis on safety of engineering systems, including seismic risk and earthquake engineering, quantitative risk assessment (QRA), life-cycle cost and performance, sustainability of green buildings and infrastructure. He has published about 400 papers and articles, and also a two-volume textbook on *probability concepts in engineering,* which have been translated into several languages; the 2nd edition of Vol I was published in February 2007. During his academic career, he has directed 55 Ph.D. students and countless post-doctoral researchers from many parts of the world. He has given invited keynote papers and lectures in numerous major national and international conferences, including the 2009 Freudenthal Keynote Lecture at the ICOSSAR'09 in Osaka, Japan and the 2010 Kwang-Hwa keynote at the ISRERM2010 in Shanghai, China. During his career, he has been serving as consultant and technical adviser to government and industry on technological risk and reliability issues, both in the U.S. and abroad. He is a member of the prestigious US National Academy of Engineering (elected in 1976) and has received a large number of prestigious awards from the ASCE and other societies, including Honorary Membership in the ASCE.

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.

FAZLUR RAHMAN KHAN (1929 - 1982) One of the foremost structural engineers of the 20th century, Fazlur Khan epitomized both structural engineering achievement and creative collaborative effort between architect and engineer. Only when architectural design is grounded in structural realities, he believed — thus celebrating architecture's nature as a constructive art, rooted in the earth — can "the resulting aesthetics … have a transcendental value and quality." His ideas for these sky-scraping towers offered more than economic construction and iconic architectural images; they gave people the opportunity to work and live "in the sky." Hancock Center residents thrive on the wide expanse of sky and lake before them, the stunning quiet in the heart of the city, and the intimacy with nature at such heights: the rising sun, the moon and stars, the migrating flocks of birds. Fazlur Khan was always clear about the purpose of architecture. His characteristic statement to an editor in 1971, having just been selected Construction's Man of the Year by *Engineering News-Record*, is commemorated in a plaque in Onterie Center (446 E. Ontario, Chicago): **"The technical man must not be lost in his own technology. He must be able to appreciate life; and life is art, drama, music, and most importantly, people."**

Please contact the Khan Chair office at 610-758-6123 or Email: infrk@lehigh.edu with any questions.