

Woh Hup Distinguished Lecture

You are cordially invited to a Lecture organized by
Department of Civil and Environmental Engineering

Advances in Direct Analysis: Ensuring Safety and Economy in Semi-Rigid Structures

by

Professor Chan Siu-Lai

*Director, Nida Technology Limited, Science Park
Retired Chair Professor in Computational Structural Engineering
The Hong Kong Polytechnic University*

Date: Thursday, 11 May 2023

**Time: 3:00pm to 5:30pm
(Pending PDU)**

Scan QR code to register.



**Venue:
Engineering Auditorium
National University of Singapore
College of Design and Engineering
9 Engineering Drive 1
Singapore 117575**

*****Seats are limited. Please register early. All are welcome and admission is free*****

Abstract

“Direct Analysis” is widely accepted in many modern design codes as a preferred analysis method for design to date. In brief, when second-order effects as $P-\Delta$ and $P-\delta$ moments and imperfections are considered, we could integrate the design into an analysis so independent design check is not needed, with design output more accurate, reliable, safe, economical and environmental friendly with less embodied carbon by less use of material. In design by Direct analysis, members will not be under or over designed in which an under designed critical member could lead to collapse of the whole structure even other members are over-sized. This design approach has now

been adopted in major international design codes such as LRFD (2016), Eurocode-3 (2005) and GB0017 (2017). Nevertheless, in past decades, a few structures were noted to possess deficiency in connection performance and it seems irrational for structural engineers to consider beam and column stiffness but ignore joint stiffness consideration by assigning arbitrarily zero and infinite stiffness for commonly assumed pinned and rigid joints. The speaker refined design to allow for semi-rigid joint stiffness in order to reflect more accurately the actual performance of a structure. Considerable improvement in structural performance was noted when joint stiffness is considered, with a significant saving in material cost and manpower as designers do not need to refine joint details to ensure full moment continuity or frictionless rotations. The practice to consider joint stiffness is becoming popular in Hong Kong and the region and this seminar will discuss about its background and applications in couple with the Direct analysis.

Speaker's Biography



Ir Professor S.L. Chan had been the Chair Professor in Computational Structural Engineering at the The Hong Kong Polytechnic University until 2022 when he retired from PolyU and joined Nida Technology Limited in Science Park as a Director. Professor Chan's research interests include the stability analysis and design of steel, composite and concrete structures, nonlinear finite element analysis, glass and slender skeletal structures, steel, rock and flood barriers, bamboo and aluminum scaffolding and pre-tensioning steel structures. During the past three decades, Professor Chan developed a new design method second-order direct analysis (SODA) allowing for imperfections for practical structures bypassing the effective length assumption and the prescriptive use of charts and tables in Code. Since 1998, SODA has been applied to the design of a number of steel and composite structures which include numerous steel structures in Hong Kong, Macau and the region including the 2008 and 2016 award winning projects in Hong Kong and the "Spectacular Roof" for MGM Resorts, being archived in Guinness record as world's longest single layer steel space frame. Further Professor Chan has delivered numerous keynote in local and overseas conferences and symposia and acted as chief editor of 3 international journals and member of board for other 7 journals. He was also a chairman of structural division, structural discipline of HKIE and a co-chairman of Fire division of HKIE. His work in second-order analysis with imperfections is notable internationally as listed among top few in the Google and Yahoo searches.

Programme Itinerary

Time	Agenda
2:30 pm - 3:00 pm	Registration
3:00 pm - 3:05 pm	Welcome Address by Professor Liew Jat Yuen, Richard, Head of Department of Civil and Environmental Engineering, NUS
3:05 pm - 5:30 pm	Woh Hup Distinguished Lecture by Ir Professor S.L. Chan followed by Q & A
5:30 pm - 6:30 pm	Buffet Dinner and Networking Session
6:30 pm	End of Programme

General Enquiry: Ms Asmidah Tel: 6516 4776, Email: asmidah1@nus.edu.sg

Co-organized by:



The Institution of Structural Engineers

Map of Engineering Auditorium. 9 Engineering Drive 1. Singapore 117575

