HKSTAM Hong Kong Society of Theoretical and Applied Mechanics
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香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Joint HKSTAM/MAE Distinguished Seminar

Static Analysis for Vibration Problems

Prof. Moshe Eisenberger

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Faculty of Civil and Environmental Engineering
Technion – Israel Institute of Technology, Technion City, Haifa, Israel

Date: **31 December 2014 (Wednesday)**
Time: **10:00 – 11:00 a.m.**
Venue: Mechanical Engineering Conference Room **2571 B** (via Lift 27/28, 2nd Floor), Academic Building Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong.
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ABSTRACT

The vibration analysis of structures is a widely researched area. Hundreds of papers were published on the topic. The problem can be divided into two groups: the first group includes cases for which an analytical solution is known, and the second group includes cases with no known analytic solutions. Benchmark solutions for the cases in the second group are highly desired for validation and comparison of existing and future numerical solutions.

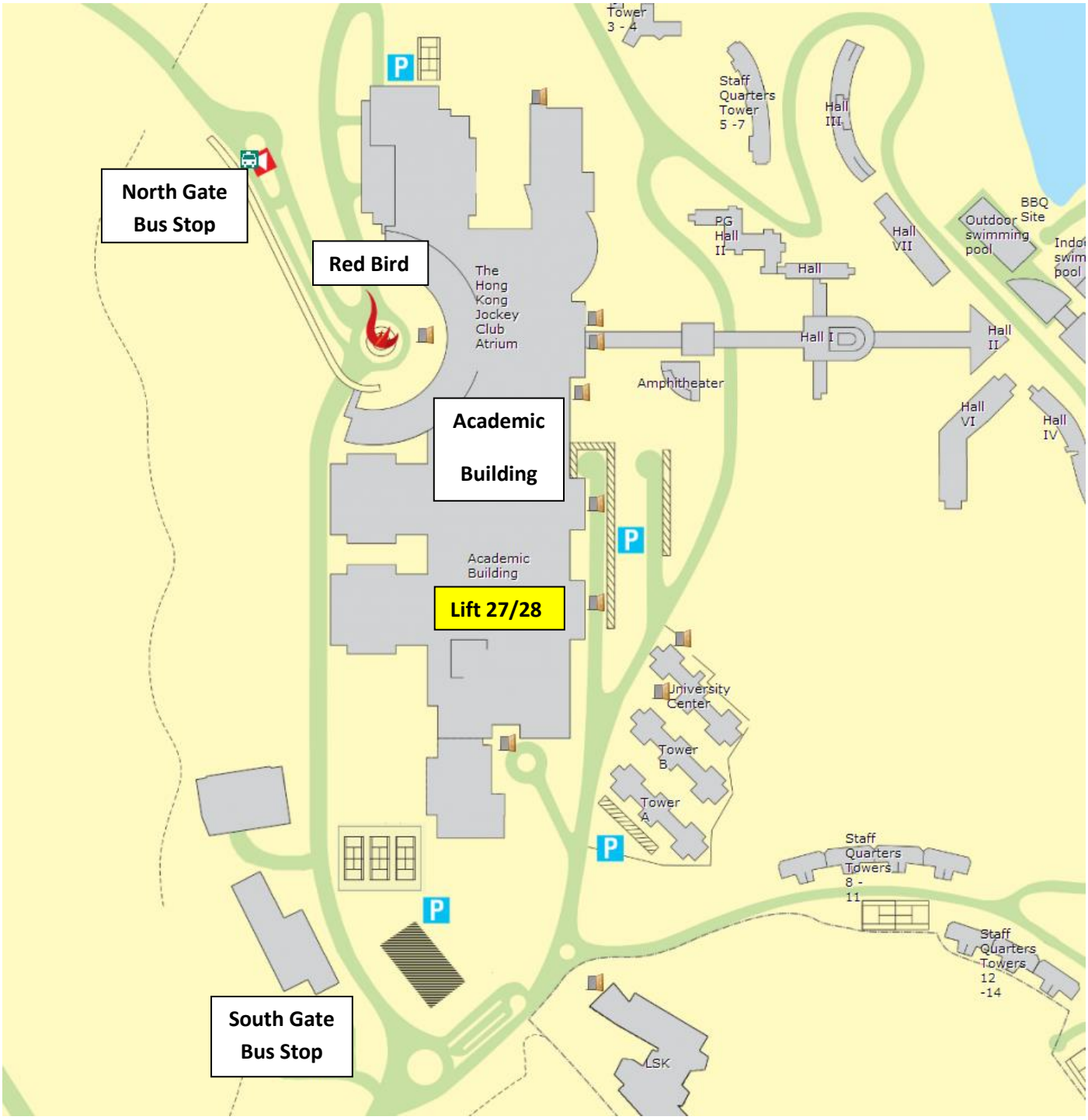
In this work a new method the solutions for the natural frequencies are found using static analysis. Starting from the equations of motion for a structure supported by elastic foundation we realize that the foundation stiffness and the inertia effect of the mass have opposite effect on the solution for the vibrating structure: The difference of these two factors is treated as a generalized elastic foundation parameter, and it can have a positive or negative value. In either case, one can solve the displacements under a given concentrated load. This deflection will be infinite if the structure losses its stiffness, or in other words, the generalized foundation is causing the structure to be unstable. Then, the solution for the vibration frequencies is equivalent to finding the values of the negative elastic foundation that will yield infinite deflection under a point load. Several examples, for rods, beams and plates are presented. Exact values are obtained with smaller computational effort.

Biography of Speaker

Professor M. Eisenberger holds the Sigmund Sommer Chair in Structural Engineering in the Faculty of Civil and Environmental Engineering at the Technion – Israel Institute of Technology. He received BSc from the Technion (1977), and MSc and PhD from Stanford University CA (1978, 1980) and since he is on the faculty of the Technion. He was visiting Professor in Carnegie Mellon University, PA (1987-9, 1993-4), and City University, HK (2006). His research is in general field of computational structural mechanics including static, dynamic, and stability analysis of structures.

Map and Direction

(1) HKUST Campus map and Lift 27/28



(2) Public transport guide to HKUST https://www.ab.ust.hk/cso/transport_guide.htm