The Raymond D. Mindlin Lecture

Department of Civil Engineering & Engineering Mechanics, Columbia University
Engineering Mechanics Committee, ASCE Metropolitan Section
Engineering Mechanics Institute, ASCE

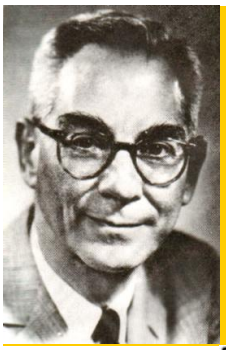
URBAN PHYSICS: IS NEW YORK A LIQUID OR A SOLID? A NEW QUANTITATIVE ENGINEERING MECHANICS APPROACH TO CITIES

Professor Franz-Josef Ulm
Massachusetts Institute of Technology

Tuesday, November 1, 2016
2:00PM-3:00PM
750 Schapiro CEPSR, Costa Engineering Commons

Abstract: By the year 2050, 6.7 billion people are expected to be living in urban environments. We are going to face the challenge of expanding the global urban network by approximately what is equivalent to 8-9 cities of New York, NY each year! The sustainable development of our urban network thus requires new quantitative approaches that can deal with cities' multiple complexities. These complexities are recognized to be much akin to molecular structures for which tools of statistical physics provides a wealth of quantitative tools to quantify city geometry and improve infrastructure performance while minimizing our environmental footprint and maximizing the resilience of our cities' building stock,– a true multiscale engineering mechanics task, specifically as we face the perils of global warming.

Biosketch: Franz-Josef Ulm is Professor of Civil & Environmental Engineering at the Massachusetts Institute of Technology. Prior to joining MIT, he was research engineer at the Laboratoire Central des Ponts et Chaussees (now IFSSTAR), the central French Civil Engineering research center for infrastructure. He joined MIT in 1999, where he is now the faculty director of the Concrete Sustainability Hub@MIT (https://cshub.mit.edu), and the Co-Director of the mixed research CNRS-MIT research unit "Multiscale Materials Science for Energy and the Environment"(https://umi.mit.edu) enabled through MIT's Energy Initaitive. A structural engineer by training, Dr. Ulm's field of study is the mechanics of porous materials; from nanoscale to macroscale of large-scale engineering applications; of which cities are but a new intriguing field of application.



The Department of Civil Engineering and Engineering Mechanics established the Mindlin Lecture to honor the pioneering contributions of Prof. Raymond D. Mindlin to the field of applied mechanics. His research encompassed photoelasticity and experimental mechanics; classical three-dimensional elasticity (e.g., Mindlin's problem); generalized elastic continua (strain-gradient and couple-stress theory); frictional contact and granular media; waves and vibrations in isotropic and anisotropic plates (Mindlin's Plate Theory); wave propagation in rods and cylinders; theory of electro-elasticity and piezoelectric crystal resonators, and crystal lattice theories.
A member of the National Academy of Engineering and the National Academy of Sciences, Prof. Mindlin received the National Medal of Science for applied mechanics and mathematics in 1979. He had been awarded the Medal for Merit in 1946, by President Harry S. Truman, for his work in developing the radio proximity fuse, a detonator for weapons used in offensive warfare that was a significant factor in World War II. ASCE created the **Mindlin Medal** in 2009.

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