

IAS Distinguished Lecture

Equilibrium and Forces: from Aristotle to Lagrange

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Date : 22 March 2017 (Wednesday)

Time : 10:00am – 11:30am (*Light refreshments will be served from 9:30am to 10:00am*)

Venue : Mr & Mrs Ho Chun Hung Lecture Theatre (LT-12), Green Zone, 4/F, Academic 1,
City University of Hong Kong



Abstract

The historical path to LAGRANGE's formulation of the Force concept and statement of the Principle of virtual velocities as the cornerstone of Statics has been two-millennium long. It is illustrative of the famous sentence by Bernard de CHARTRES "*Nani gigantum humeris incidentes*" [Dwarfs standing on the shoulders of giants] and shows the laborious process through which the concept of force, which is now often supposed to be understandable by students at a first encounter, has been elaborated. It was primarily associated with gravity and, for long, the fundamental quest of the theory of Statics has been trying to understand and explain the properties of the "Simple Machines" following the definition given by Renaissance scientists, namely the lever, ramp, screw, pulley and pulley blocks, wedge... that use mechanical leverage to multiply force. One may consider that this long-lasting elaboration started with ARISTOTLE'S and ARCHIMEDES' approaches, which opened the two fundamental pathways that were to be followed all along the History of Mechanics. The paradox of referring to movement for analysing equilibrium, which had been present since the very beginning, started to be overcome with DESCARTES and BERNOULLI (Johann) until being ultimately clarified by LAGRANGE's statement. This gave way to the dual approaches and variational numerical methods that are commonly used presently in Mechanics and other disciplines, but should not lead to forget about the physical viewpoint in any mathematical model.

Biography

Professor Jean Salençon is Honorary Professor at the École polytechnique and the École nationale des ponts et chaussées (France). He was Chair professor-at-Large and Visiting Distinguished professor at the City University of Hong Kong (2011 - 2016).

He was the President of the French Academy of Sciences during the years 2009 & 2010 and presided over the Institut de France in 2009. He is also a Member (Emeritus) of the French Academy of Technologies, a foreign Member of the Istituto Lombardo (Milan) and of the Academia das Ciências de Lisboa (Portugal), an honorary Member of the Hungarian Academy of Sciences and a Corresponding Member of the Académie des sciences et lettres de Montpellier (France).

He is a recognized leader, worldwide, in the field of Continuum Mechanics. More specifically, his research activities were essentially developed in the Solid Mechanics Laboratory (École polytechnique, Palaiseau, France) with, as an essential characteristic, the transfer of basic concepts and results in Continuum mechanics to practical applications in civil and mechanical engineering. Among his major contributions, one may mention the elaboration of a Theory of Yield Design based upon the only concept of yield strength of the constituent materials and simple mathematical results of convex analysis as a convenient general framework for all types of stability analyses: slopes and dams, anisotropic and reinforced soils, yield design of plates and slabs, probabilistic approach, homogenization, etc. Other aspects of the research activities of Jean Salençon include Viscoelasticity, Elastoplasticity and Elasticity.

Professor Jean Salençon has been a member of various scientific councils and administrative boards of public or private entities. He is the author of more than 190 publications including 12 books and textbooks, 8 tutorial and practical multimedia software.

All are welcome

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