Mechanical Engineering
UNIVERSITY OF CALIFORNIA, BERKELEY

Department of Mechanical Engineering

Russell Severance Springer Colloquium

presents

"Some Cases of Unrecognized Transmission of Scientific Knowledge: From Antiquity to Gabrio Piola's Peridynamics and Generalized Continuum Theories"

Professor Francesco dell'Isola

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Wednesday, January 17th
1:00 p.m.
3110 Etcheverry Hall

Coffee & Cookies will be served.

ABSTRACT

The aim of this paper is to show some typical mechanisms in the transmission of scientific knowledge through the study of some examples. We will start by considering some ancient examples concerning Democritus, Heron, Galileo and the history of the theory of tides. Then we will mainly focus on the works of the Italian scientist Gabrio Piola (1794-1850). In particular: i) we show clear similarities between Noll's postulation of mechanics and the 'ancient' presentation by Piola of the ideas needed to found Analytical Continuum Mechanics; ii) we prove that non-local and higher gradient continuum mechanics were conceived (and clearly formulated) already in Piola's works; iii) we explain the reasons of the unfortunate circumstances which caused the (temporary) erasure of the memory of many among Piola's contributions to mechanical sciences. Moreover, we discuss how the theory which has recently been called peridynamics, i.e. a mechanical theory which assumes that the force applied on a material particle of a continuum depends on the deformation state of a neighborhood of the particle, was first formulated in Piola's works. In this way we argue that in the passage from one a cultural tradition to another the content of scientific texts may often be lost, and it is possible to find more recent sources which are scientifically more primitive than some more ancient ones.

BIOGRAPHY

Professor Francesco dell'Isola received his MS in 1986 from the University of Naples Federico II and his Ph.D. in 1992 from Ministry of University and Scientific and Technological Research (MURST). He is currently a Professor in the Department of Structural and Geotechnical Engineering at the University of Rome. Professor dell'Isola has established himself as a foremost authority on the history of mechanics. He has strong expertise in strain-gradient elasticity theory, with direct application to mechanics and physics at micro-and nano-scales. He has also made significant contributions to scale efforts in fluid mechanics and capillary systems.

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