



**POLITECNICO
DI TORINO**

DISMA Dipartimento di
Scienze Matematiche
G. L. Lagrange
ECCELLENZA 2018 · 2022

Wednesday the **27 June 2018** at 10:00
Politecnico di Torino, DISMA, Aula Buzano (third floor)

Alfio GRILLO

Associate Professor at Politecnico di Torino.

Salvatore DI STEFANO

PhD student in Pure and Applied Mathematics

A joint graduate program of Politecnico di Torino and Università di Torino.

The Role of Inhomogeneities in the Mechanics of Tumor Growth

Prof. Boralevi moderates the discussion

Abstract

The study of tumor growth is a largely investigated research topic, because of its implication on public health. In this sense, mathematical modelling can give some important contributions to understand the complexity of the phenomena that occur for the onset and development of tumors. To address this problem, an interdisciplinary approach is required in order to identify the role played, at different scales of observation, by mechanical and chemical factors.

Within the Continuum Mechanics framework that we adopted, a tumor tissue is described as a soft porous medium, saturated with an interstitial fluid, that transports nutrients and other biological macromolecules and species. Growth is conceived as the result of two processes: one relies on the mass transfer among the different constituents, taken into account through sources and sink terms, and one is featured with the changes of the internal structure of the tumor, described by means of a growth tensor. Since such tensor is, in general, non-integrable and incompatible, it induces a non-Euclidean metric, which allows to define a Levi-Civita connection. The scalar curvature associated to such connection is an indicator of the material inhomogeneities produced by growth.

The aim of this talk is to present a mathematical model describing the growth of a tumor in the avascular stage, trying to answer the following question: If a tissue finds itself in a grown configuration, what is the influence of growth-induced inhomogeneities on the evolution of the tumor?

The content of this seminar is extracted from the work “Self-induced growth through evolving material inhomogeneities”, by Salvatore Di Stefano, Ariel Ramírez-Torres, Raimondo Penta and Alfio Grillo, submitted to International Journal of Nonlinear Mechanics.

Biography

Alfio Grillo is Associate Professor of Mathematical Physics at Politecnico di Torino. His main scientific interests are Continuum Mechanics, Biomechanics of Soft Tissues, and Analytical Mechanics.

Salvatore Di Stefano is a second year PhD student in Theoretical and Applied Mathematics at Politecnico di Torino, under the supervision of Prof. Alfio Grillo. His scientific interests concern the study of theoretical and computational aspects of Finite Strain Elastoplasticity, and Analytical Mechanics, for addressing problems of biomechanical interest.

Save the date for the next event: Wednesday the 04th of July 2018