Università Politecnica delle Marche
DIISM - Dipartimento di Ingegneria Industriale
e Scienze Matematiche
Dipartimento di Eccellenza

AVVISO DI SEMINARIO
4 novembre 2021 – ore 15:30
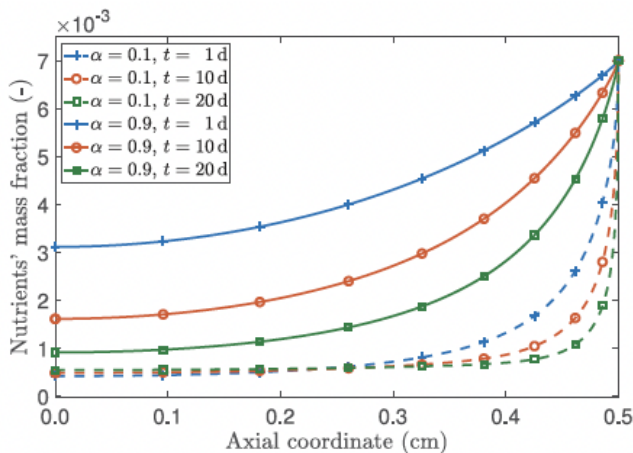
Prof. Alfio Grillo

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"An approach to growth mechanics based on Fractional Calculus"

Abstract:

(joint work with Ariel Ramírez-Torres and Salvatore Di Stefano)

Spatial profile of the concentration (mass fraction) of the nutrient substances for two values of the exponent of the nonlocality power law and for different times (in days).

"Ramírez-Torres, A., Di Stefano, S., Grillo, A.: "Influence of non-local diffusion in avascular tumour growth", Mathematics and Mechanics of Solids, 26(9) (2021) 1264-1293

In this talk, I would like to report on a recent work in which Fractional Calculus is employed to formalize some chemo-mechanical aspects of the growth of a tumor in the time window preceding the formation of blood vessels inside it. I will assume that the chemical agents triggering tumor growth follow a non-Fickian law of diffusion characterized by a non-local relation between their mass flux vector and the corresponding concentration gradient. I will show that this requires the introduction of a "non-local diffusivity tensor" and a power law fading in space, whose exponent can be tuned in such a way that one can gradually pass from classical Fick's law to a regime in which diffusion is inhibited.

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