Seminário de Mecânica

An Introduction to Tumour Growth Modelling Part 2: Asymptotic and Stability Analysis of a Two Dimensional Two-Phase Model of Avascular Tumour Growth based on Moving Frame Steady States

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Auditório do MAT

Abstract. We investigate avascular tumour growth as a two-phase process consisting of cells and liquid through the moving boundary continuum model formulated by Byrne, King, McElwain, and Preziosi (Applied Mathematics Letters, 2003, 16, 567-573).

By working with steady state solutions in a moving frame, we define instability of a time-dependent non-homogeneous base state solution in a way that allows us to compare simulated solutions to the saturation growth and exponential decay profiles of tumour size.

We formulate the analogous model for tumour growth in two dimensions. After some simplifying assumptions (negligible nutrient uptake and cell drag), we perform asymptotic analysis on the system satisfied by the two dimensional perturbations on a one dimensional solution, which we then compare to its numerical counterpart. Eventually, through the method of matched asymptotics, which will be described in some detail, we characterised boundary layers and corresponding outer and inner solutions which allowed us to obtain a condition for instability in the two dimensional case.

This second seminar will be delivered in Portuguese, with slides in English.