Mathematical Topics on the Modelling Complex Multicellular Systems

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This seminar deals with of a critical analysis and some developments related to the mathematical literature on multiscale modeling of multicellular systems involving tumor immune cells competition at the cellular level.

The analysis is focused on the development of mathematical methods of the classical kinetic theory to model the above physical system and to recover macroscopic equation from the microscopic description. Various hints are given toward research perspectives, with special attention on the modeling of the interplay of microscopic (at the cellular level) biological and mechanical variables on the overall evolution of the system. Indeed the aim consists in organizing the various contributions available in the literature into a mathematical framework suitable to generate a mathematical theory for complex biological systems.

While the above topic is developed it is interesting analyzing how the interplay between mathematics and biology has fruitfully developed with an interesting progess also in the attitude (from Wiegner (1960) to Hartwell (1999). In the same time also the evolution of mathematical methods related to modelling tumor growth has rapidly grown in a few years as documented by Adam and Bellomo (1996) to Preziosi (2003).

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E. Wigner, The unreasonable effectivness of mathematics in the natural sciences, *Comm. Pure and Appl. Math.*, 13, 1–14, (1960).