

Stochastic effects in a time-delayed model for autoimmunity

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In this talk I will discuss a new time-delayed mathematical model for autoimmune diseases caused by viral infections. This detailed model takes particular account for the populations of different types of T cells, as well as interleukin 2 (IL-2). Stability analysis of various steady states is performed to identify parameter regions where the model exhibits different types of behaviour, including normal clearance of infection, chronic infection, as well as periodic oscillations associated with autoimmune response. I will discuss a stochastic version of the model that allows us to investigate the role of stochastic effects in facilitating possible oscillatory dynamics in the model. I have used the van Kampen's system size expansion to derive a linear delayed Langevin model for the fluctuations around steady states, and to obtain estimates for the variance and coherence of stochastic oscillations around deterministically stable steady states.