Dynamics of structured populations: From aging demographics to cell size control

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I will review PDE models of population dynamics structured according to age, size, or added size. A few new models will be presented including deterministic descriptions of population control through delayed births and of cell division through sizer and adder mechanisms. We show how a softer, staggered birth policy can be effective in population control. In cell-size control, we show that an adder mechanism can lead to blow-up of cell size. Finally, we develop stochastic counterparts to the classical deterministic aging dynamics theories. We show how the classic age-dependent population models are connected to a hierarchy of equations for reduced probability distributions, the lowest order of which is a master equation for the total stochastic population. Differences in the stochastic description of birth through budding or splitting are explored.

Note: Cookies will be served at 3:30