

Global Attractivity and Periodicity in Some Differential Delay Models

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Differential delay equations are frequently used as mathematical models of real-world phenomena where the time-delays are intrinsic features of their functioning. In the past half a century they were particularly useful in adequate modeling of various biological processes, especially in population dynamics and physiology. We consider simple form scalar differential delay equations. Their partial cases include several well-known equations such as Mackey-Glass hematopoiesis models (blood cell production) and Nicholson's model of blowfly populations. Dynamics of solutions in such equations are studied. Sufficient conditions are derived when the unique positive equilibrium is globally asymptotically stable. The stability conditions are given in terms of induced interval maps. The existence of periodic solutions slowly oscillating about the equilibrium is also established. The periodic oscillations in the models always exist when the equilibrium is linearly unstable and there is the negative feedback property about the equilibrium. This is a joint work with Prof. Hideaki Matsunaga of Osaka Metropolitan University.

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