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Transmission dynamics and periodic phenomena in a model of West Nile virus with maturation time

West Nile virus is a typical vector-borne disease transmitted to humans and animals by *Culex* mosquitoes, where avian birds serve as amplification hosts for the virus. To investigate the role of mosquitoes in the transmission dynamics of West Nile virus, we formulate a system of delay differential equations with a standard incidence rate to model the interaction between mosquitoes and birds. We show that the maturation time of mosquitoes affects disease transmission in sophisticated ways. It turns out that a large maturation delay will lead to the extinction of mosquitoes and the disease, a small maturation delay will stabilize the epidemic level of the disease, and an intermediate maturation delay will cause sustainable oscillations of mosquito population, recurrence of diseases, and even mixed-mode oscillation with an alternation between oscillations of large and small amplitudes.