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Oscillation and driving mechanism in compartmental models for mosquito-borne diseases with time delay

West Nile virus, malaria and dengue are typical mosquito-borne diseases which are transmitted to humans through the bite of vector-mosquitoes. Vectors like mosquitoes play a critical role in the transmission and spread of the diseases. To investigate the role of vectors and the transmission dynamics of mosquito-borne diseases, we formulate a system of delay differential equations involving vectors and hosts to study the impact of average temperature. In the model, we choose the standard incidence rate to model the interaction between vectors and amplification hosts. Bifurcation analysis of the system shows that the mosquito population can force the system to oscillate, yet the usual incidence between the vector and host can not. This result indicates that vector population is the driving factor for the oscillation in disease transmission under the impact of temperature. This talk is based on the joint work with Dr. Guihong Fan.