1163-92-336   **Hongying Shu**, **Wanxiao Xu** and **Xiang-Sheng Wang***, Department of Mathematics, University of Louisiana at Lafayette, Lafayette, LA 70503, and **Jianhong Wu**. *Complex dynamics in a delay differential equation with two delays in tick growth with diapause.*

We consider a delay differential equation for tick population with diapause, derived from an age-structured population model, with two time lags due to normal and diapause mediated development. We derive threshold conditions for the global asymptotic stability of biologically important equilibria, and give a general geometric criterion for the appearance of Hopf bifurcations in the delay differential system with delay-dependent parameters. By choosing the normal development time delay as a bifurcation parameter, we analyze the stability switches of the positive equilibrium, and examine the onset and termination of Hopf bifurcations of periodic solutions from the positive equilibrium. Under some technical conditions, we show that global Hopf branches are bounded and connected by a pair of Hopf bifurcation values. This allows us to show that diapause can lead to the occurrence of multiple stability switches, coexistence of two stable limit cycles, among other rich dynamical behaviours. (Received September 03, 2020)