1106-92-220 **Zhilan Feng*** (fengz@purdue.edu), Department of Mathematics, Purdue University, West Lafayette, IN 47907. *Emerging disease dynamics in a model coupling within-host and between-host systems.*

Epidemiological models and immunological models have been studied largely independently. However, the two processes (within- and between-host interactions) occur jointly and models that couple the two processes may generate new biological insights. Particularly, the threshold conditions for disease control may be dramatically different when compared with those generated from the epidemiological or immunological models separately. We developed and analyzed an ODE model, which links an SI epidemiological model and an immunological model for pathogen-cell dynamics. When the two sub-systems are considered in isolation, the dynamics are standard and simple. That is, either the infection-free equilibrium is stable or a unique positive equilibrium is stable depending on the relevant reproduction number being less or greater than 1. However, when the two sub-systems are explicitly coupled, the full system exhibits more complex dynamics including backward bifurcations; that is, multiple positive equilibria exist with one of which being stable even if the reproduction number is less than 1. The biological implications of such bifurcations are illustrated using an example concerning the spread and control of toxoplasmosis. (Received August 31, 2014)