

Mosquito suppression models consisting of two sub-equations switching each other

Jianshe Yu (jsyu@gzhu.edu.cn)

Guangzhou University

The release of *Wolbachia*-infected mosquitoes in 2016 and 2017 enabled near-elimination of the sole dengue vector *Aedes albopictus* on Shazai and Dadaosha islands in Guangzhou. Mathematical analysis may offer guidance in designing effective mass release strategies for the area-wide application of this *Wolbachia* incompatible and sterile insect technique in the future. The two most crucial questions in designing release strategies are how often and in what amount should *Wolbachia*-infected mosquitoes be released in order to guarantee the success of population suppression. In this talk, I will introduce our recent works on answering the two questions which have been published in the following three papers.

- J. Differ. Equations, 2020, 269(7): 6193-6215.
- J. Differ. Equations, 2020, 269(12): 10395-10415.
- SIAM J. Appl. Math., 2021, 81(2): 718-740.

By treating the released mosquitoes as a given function, we proposed mosquito suppression models consisting of two sub-equations switching each other. An almost complete characterization of interactive dynamics of wild and released mosquitoes are offered, including the global asymptotic stability of zero solution and the exact number of periodic solutions of these models. It is well known that to obtain existence and also uniqueness conditions for periodic solutions is mathematically challenging for many dynamical systems and there are few such results existed. I hope the methods and techniques used in these three papers can be usefully applied to other model analysis as well.