

Departmental Colloquium

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2:00pm, HH-3017**

**Analysis and Application in a Dynamical Switching Model with
Environment Transmission**

ABSTRACT:

The role of contaminated environment in the transmission dynamics of epidemic has been discussed and confirmed in either theoretical or applicable aspects. It is known that the environment transmission has certain characteristics. Only when the quantity of virus or bacteria (VoB) in environment is above a critical level, it can lead to population infection and the incidence rate can reach a saturation value as the quantity of VOB increases to a certain degree. In order to further understand this mechanism and find out its effect on disease spread, we establish a more reasonable dynamical model by combining the threshold switching and the effect of saturation of the quantity of VoB in environment. It is found that under different conditions, there may appear coexistence of one, two, three or even four steady states, and bistability phenomenon is possible in the model, which shows that the development trend of epidemic not only depends on the model parameters, but also is associated with the initial condition. In addition, we study the influence of key parameters on the dynamical behavior, which can provide theoretical basis for disease control. Then we apply the model to study the mechanism of transmission of serotype Asian 1 and serotype O foot-and-mouth disease in livestock and assess development trend of the diseases.