
GERGELY ROST, Bolyai Institute, University of Szeged, Hungary

Endemic Bubbles Generated by Delayed Behavioral Response in Epidemic Models

Several models have been proposed to capture the phenomenon that individuals modify their behavior during an epidemic outbreak. This can be due to directly experiencing the rising number of infections, media coverage, or intervention policies. In this talk we show that a delayed activation of such a response can lead to very interesting dynamics even in simple epidemic settings. For SIS type process, if the delayed response is relatively weak, the system preserves global stability, regardless of the delay. However, for stronger responses, we can observe stability switches as the basic reproduction number is increasing. First, the stability is passed from the disease free equilibrium to an endemic equilibrium via transcritical bifurcation as usual, but a further increase of the reproduction number causes sustained oscillations, which later disappear for high reproduction numbers, forming a structure in the bifurcation diagram what we call endemic bubble. Detailed mathematical analysis is given for the typical media functions used in the literature.

Joint work with Maoxing Liu, Eduardo Liz, Gabriella Vas.