Endemic Bubbles Generated by Delayed Behavioral Response in Epidemic Models

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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 some interesting dynamics. In the case of SIS type process, if the response is not too sharp, the system preserves global stability. However, for sharp delayed response, 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 oscillations, which later disappear, forming a structure in the bifurcation diagram what we call endemic bubble.

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