Delay adaptation: High dimensional data clustering and global Hopf bifurcation

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This talk intends to put three PhD theses (and their derived publications) in a coherent framework about state-dependent delay, high dimensional data clustering, and dynamic bifurcations. Some physiological evidence of delay adaption will be presented and a neural network architecture will be discussed to illustrate the usefulness of delay adaptation for pattern recognition in high dimensional data. Focus will be on the application of equivalent-degree approach to examine the birth and global continuation of Hopf bifurcations of periodic solutions. Some recently developed techniques will be described to show how local bounds of periods of periodic solutions can be glued together globally along a continuation of periodic solutions in the Fuller space, and how the global bifurcation theory can be applied to establish the co-existence of slowly and rapidly oscillatory periodic solutions when the parameter is away from its critical values where local Hopf bifurcations take place.