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Shane Kepley* (sk2011@math.rutgers.edu). *Finding and studying saddle-node bifurcations in Hill models with high dimensional parameters.*

Hill Models are widely used for modeling enzymatic reactions under a quasi-steady state approximation. A major problem when using Hill Models to study the dynamics of gene regulation is the rapid increase in the parameter dimension as additional gene interactions become involved. This presents a significant difficulty when studying equilibria in Hill models as their existence, location, and stability can vary wildly due to a variety of bifurcations.

In this talk we introduce techniques for finding saddle-node bifurcations globally in the parameter space despite the high dimension. Our approach combines topological and combinatorial techniques which initially reduce the subset of parameters on which to search with fast numerical algorithms for finding these bifurcations based on solving an appropriate zero finding problem. This can be done efficiently using the *HillCont* Python library we have written specifically for this purpose. We will demonstrate the approach with several examples. (Received January 15, 2021)