1117-37-427 **Dinesh Kasti*** (dkasti@fau.edu), **William D Kalies**, **Konstantin Mischaikow**, **Arnaud Goullet** and **Shaun Harker**. *Efficient computation of Lyapunov functions and lattice structures for attractors.*

We provide an efficient algorithm to construct piecewise constant Lyapunov functions for dynamics generated by a continuous nonlinear map. It uses a memory efficient data structure for storing nonuniform grids. It utilizes dijkstra algorithm along with manhattan distance to compute distance potential function which is required to compute the Lyapunov function. We further prove that if the diameters of the grid elements go to zero, then the sequence of piecewise constant Lyapunov functions generated by our algorithm converge to a continuous Lyapunov function for the dynamics generated by the nonlinear map. We illustrate these techniques via the applications on two problems from population biology. Finally, we will elaborate the use and importance of lattice structures of attractors for these techniques. (Received January 18, 2016)