1158-14-268 **Dhagash Metha**, **Tianran Chen**, **Tingting Tang*** (ttang2@sdsu.edu) and **Jonathan Hauenstein**. *Understanding the impact of regularization on loss surface of deep linear network using algebraic geometry.*

Deep linear networks are neural networks with multiple hidden layers but no nonlinearity between layers. They are often used as toy models to used as toy models to understand the loss surface of deep neural networks. We explore properties of the optimization landscapes (loss surface) of the deep linear neural network models with a general L2 regularization term using numerical algebraic geometry. In particular, we establish upper bounds on the number of isolated stationary points of these networks with the help of algebraic geometry. Using these upper bounds and utilizing a numerical algebraic geometry method, we find all stationary points for modest depth and matrix size. We show that in the presence of the non-zero regularization, deep linear networks indeed possess local minima which are not the global minimum. (Received March 02, 2020)