1142-08-222   **Jonathan D Hauenstein** (`hauenstein@nd.edu`), Notre Dame, IN 46556, and **Tingting Tang***
(`ttang@nd.edu`). *Markov Chain Monte Carlo assisted method for finding real solutions of nonlinear polynomial system.*

In this talk, we propose a new approach for finding all the real solutions of a nonlinear system. First, we transform the nonlinear system into a optimization problem. Then, we further transform the objective function into a probability density function where probability one is achieved at every real solution of the nonlinear system. Finally, we use Markov-chain Monte-Carlo to improve the selection of initial parameters for the appropriate optimization method which we use to solve the optimization problem. Examples are given to demonstrate the performance of this new method of solving nonlinear system. (Received September 04, 2018)