1116-34-1854 **Shelby R. Stanhope*** (srs114@pitt.edu), **David Swigon** (swigon@pitt.edu) and **Jonathan Rubin** (jonrubin@pitt.edu). *Existence and uniqueness of solutions to the inverse problem for linear dynamical systems with uncertain data.* Preliminary report.

I will analyze the problem of estimating the parameters of a dynamical system model from discrete data, i.e., the inverse problem for dynamical systems. In the case of a linear model, I will present necessary and sufficient conditions for the data to yield a unique matrix of parameters. Contrary to our expectations, we find that the existence of model parameters corresponding to given data is guaranteed only for a subset of potential data sets and that there is only a narrow range of data that yields a unique set of parameters. A key practical issue of estimating how much uncertainty in data can be tolerated without compromising the existence and uniqueness of inverse problem solutions will be addressed. Analytical and numerical estimates of the largest allowable error in the data that still yields a unique parameter matrix will be presented. In addition, I will also examine connections between perturbations in the data and the stability of the equilibrium of the system. (Received September 21, 2015)