1128-62-34 **Jie Zhao*** (jie.zhao@wsu.edu), Neill222, Washington State University, Pullman, WA 99163, and **Robert H. Dillon**, Neill 324, Washington State University, Pullman, WA 99163. *Bayesian Network and Parameter Estimation for the nonlinear ODE System.* Preliminary report.

Differential equation models are widely used in many scientific fields that include engineering, physics , chemistry and biosciences. The solution of the differential equation system given initial values and coefficients are often unique if it is continuously differentiable. However, most systems are not solvable analytically. This makes it harder to determine the uncertainties, such as initial values or coefficients (called parameters) by using data-fitting method. Most current parameter estimation methods based on the local smoothing and some least squares-based approaches under a framework of measurement error. Their typical problems are subject to high computational cost, sensitivity to initial values or large sampling variability. This paper presents a method for estimating an nonlinear ordinary differential equation model with partially observed data and derive a parallel MCMC simulation method for a hierarchical Bayesian inference model. It can improve the convergence of the fit and avoid converging a local minima. The efficacy of the new method is illustrated by simulations and a real time-series data of $TGF\beta$ and $SDF-1$ signaling pathways in breast cancer. (Received January 31, 2017)