

1135-VF-2217      **Peter Agaba\***, Mathematics Department, 1906 College Heights BLVD, Bowling Green, KY  
42101. *Optimal Control Theory and Parameter Estimation of Parameters in a Differential  
Equation Model for Patients with Lupus.*

System Lupus Erythematosus (SLE) is a chronic inflammatory autoimmune disorder that affects many parts of the body including skin, joints, kidneys, brains and other organs. Lupus Nephritis (LN) is a disease caused by SLE. Given the complexity of LN, we establish an optimal treatment strategy based on a previous developed mathematical model. As in Budu-Grajdeanu et al., (2010), our model variables are: Immune Complexes (I), Pro-inflammatory mediators (P), Damaged tissue (D), and Anti-inflammatory mediators (A). The analysis in this research project focuses on analyzing therapeutic strategies to control damage using both parameter estimation techniques (integration of data to quantify any uncertainties associated with parameters) and optimal control with the goal of minimizing time spent on therapy for treating damaged tissue by LN. Our simulated results for LN model will be presented in our talk. (Received September 25, 2017)