1145-92-967 **Alvaro A Ortiz Lugo*** (ortizlaa@mail.uc.edu), **BenJamin L Vaughan** (vaughabn@ucmail.uc.edu) and **Sadiqah Al Marzooq** (s_almarzooq@yu.edu.sa). *An Improved Mathematical Model of Pathogen Dynamics in Water Distribution Networks.*

A water distribution network aims to provide a safe water supply. Biological contamination of this system can occur by breach of pipes and other factors, impacting the water quality. Frequently, microorganisms form biofilms on the interior surface of pipes, which are aggregates of microorganisms that adhere to solid surfaces through self-secreted extracellular polymeric substances. The presence of biofilms can allow harmful bacteria to persist within the distribution network, possibly degrading water quality. In this talk, we analyze a mathematical model of the dynamics of non-native bacteria in the native drinking water biofilm within a large network of pipes, for different flow functions. We analyze the dynamics of models using linear stability analysis and other techniques. Realistic water distribution systems, have a large number of connections making computational calculations difficult, to address this we develop an efficient algorithm for predicting the long-time behavior of the pathogen population within the network and prove mathematically these predictions and the analytical results are validated using numerical simulations. The modeling framework brings together graph theory and ordinary differential equations, with impact in numerical methods and dynamical systems (Received September 17, 2018)