Title: An integrated approach to pathogen growth modeling

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Abstract: This poster presentation introduces an approach developed at the Center for Uncertainty driven Computational Biomechanics at University of South Carolina to speedup the development of pathogen models. The methodology is based on an integrated workflow between computation, mathematical modeling and experimentation, which is fully supported and informed by uncertainty quantification with the goal of developing a basic understanding of pathogen behavior. This is presented in the context of developing a multiscale predictive model of aflatoxin synthesis in Aspergillus parasiticus, chosen as the biological model for the study. The preliminary study involves the development of a quantitative light and acoustic imaging methodology for extracting hyphal morphologies at multiple scales from live cells. This experimental data is then used in a comprehensive Bayesian framework to inform the predictive model that incorporates the co-dependence of multi-scale growth and aflatoxin production. We envision that the successful completion of this project will lead to discovery of novel therapeutic tools to prevent aflatoxin synthesis. Also we expect that our mathematical model can be extrapolated to explain the behaviors of other fungal pathogens as well.