BIOMATH SEMINAR
Friday, Sept 19, 1-2 pm
Harris 4119

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A Hybrid Agent-based and Differential Equations Model for Simulating Antibiotic Resistance in a Hospital Ward

Abstract: Serious infections due to antibiotic-resistant bacteria are pervasive, and of particular concern within hospital units due to frequent interaction among health-care workers and patients. Such nosocomial infections are difficult to eliminate because of inconsistent disinfection procedures and frequent interactions among infected persons, and because ill-chosen antibiotic treatment strategies can lead to a growth of resistant bacterial strains. Clinical studies to address these concerns have several issues, but chief among them are the effects on the patients involved. Realistic simulation models offer an attractive alternative. We will present a hybrid simulation model of antibiotic resistant infections in a hospital ward, combining agent-based simulation to model the inter-host interactions of patients and health-care workers with a detailed differential equations and probabilistic model of intra-host bacterial and antibiotic dynamics. Initial results to benchmark the model demonstrate realistic behavior and suggest promising extensions to achieve a highly-complex yet accurate mechanism for testing antibiotic strategies.