1092-92-252 **Matthew Oremland*** (moremlan@vt.edu). *A Framework for Solving Optimization Problems for Agent-Based Models.*

Agent-based models (ABMs) are a class of computer simulation model in which agents interact with each other and their environment according to local update rules. While ABMs are a powerful tool, they are often computationally intensive and suffer from a lack of mathematically analytical tools. We present a framework for solving optimization problems with ABMs by constructing a system of equations that describe high-level behavior of the ABM.

The framework is illustrated by use with SugarScape, a well-known large-scale ABM. In SugarScape, agents patrol a virtual landscape in search of sugar. We investigate an optimization problem by periodically taxing agents for their sugar. Our goal is to determine tax schedules that minimize deaths and maximize the amount of sugar collected.

A system of difference equations is derived to describe the agents' movement, sugar accumulation, and population levels. Parameter estimation, symbolic regression, and heuristic methods are employed to refine the equations and to solve the optimization problem. Optimal tax schedules (as determined by the equations) are compared with those obtained by the ABM in order to determine the descriptive effectiveness of the proposed framework. (Received August 11, 2013)