

# Coarse graining of an individual-based plant model

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Ecological systems are traditionally modeled by systems of equations. However, recently individual-based and agent-based models have received rapidly growing attention. While these models allow for a much more direct representation of ecological reality, they are difficult to analyze with the established computational tools for equation-based models and are hence presently only studied by numerical simulation. In this contribution we describe the previously proposed field of neighborhood approach as a typical example of an individual-based ecological modeling framework. We then discuss how such models can be coarse-grained numerically using the so-called "equation-free" model analysis. This approach allows to study an individual-based model by the same tools that are normally used to investigate equation-based models, providing a much-needed bridge between the different modeling paradigms. Finally, we describe an ongoing effort to implement an equation-free modeling and analysis framework for field-of-neighborhood models on cell processors. We emphasize that the cell architecture is particularly advantageous for this project as the equation-free approach lends itself naturally to parallelization and the time-critical computations in field-of-neighborhood models can be performed efficiently on the rendering pipeline.