1023-92-1427 **Nikolay S Strigul*** (nstrigul@princeton.edu), Department of Ecology and, Evolutionary Biology, Princeton University, Princeton, NJ 08540, and **Denis Pristinski** and **Stephen Pacala**.
Analytically tractable approximation of a forest individual-based simulator.

Individual-based forest simulators are spatial stochastic processes that predict properties of populations and communities by simulating the fate of every plant throughout its life cycle. They are a proven and commonly used tool for forest management, but they are also analytically intractable; this limits their usefulness to basic scientists. We have developed a new spatial individual-based forest model that is based on a new approximation for the plasticity of crown shape. Its structure allows us to derive an accurate approximation to the individual-based model for the means of the stochastic process in a forest simulator that predicts the mean densities and size structures in the simulator using the same parameter values and functional forms, and, also, is analytically tractable. The approximation is represented by a system of Von Foerster partial differential equations coupled with an integral equation that we call the Perfect Plasticity Approximation (PPA). We have derived a series of analytical results including equilibrium abundances for trees of different crown shapes, stability conditions, transient behaviors, such as the constant yield law and the 3/2 thinning law, and two species coexistence conditions. (Received September 26, 2006)