

IN THE GARDEN OF BRANCHING PROCESSES
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ABSTRACT

The current paper surveys and develops numerical methods for Markovian multitype branching processes in continuous time. Particular attention is paid to the calculation of means, variances, extinction probabilities, and marginal distributions in the presence of a Poisson stream of immigrant particles. The Poisson process assumption allows for temporally complex patterns of immigration and facilitates application of marked Poisson processes and Campbell's formulas. The methods and formulas derived are applied to four models: two population genetics models, a model for vaccination against an infectious disease in a community of households, and a model for the growth of resistant HIV virus in patients undergoing drug therapy.