Diffusion approximation of critical controlled branching processes using limit theorems for martingale differences

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Abstract:

Controlled branching processes are stochastic processes appropriate to model generation sizes in population dynamics studies where a control on the growth of population size is necessary at each generation. The main aim of this paper is to provide a Feller diffusion approximation for critical controlled branching processes. Previously, González and del Puerto - Methodol Comput Appl Probab (2012) 14:843–861, have proved the result by using operator semigroup convergence theorems. An alternative proof is now provided making use of limit theorems for matingale differences. From a practical viewpoint, the interest of developing this result stems from the usefulness of it in determining the asymptotic distributions of estimators of the main parameters of a controlled branching process.

Keywords:
Controlled branching processes:Weak convergence theorem; martingale differences