

A CONTINUOUS STATE NONLINEAR BRANCHING PROCESS

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Abstract:

A general continuous state branching process can be identified as the unique solution to a SDE driven by a Brownian motion and a compensated Poisson random measure; see Bertoin and Le Gall (2006) and Dawson and Li (2012). Adapting this SDE, we can interpret solution to the modified SDE as a continuous state branching process with branching rates depending on the current population size.

Using a martingale approach, we study its survival/extinction behaviors and find respective sufficient conditions on the branching parameters under which the process either survives with probability one or dies out with a positive probability. Similarly, we can also discuss the explosion behaviors for the nonlinear continuous state branching process.

References

- [1] J. Bertoin and J.-F. Le Gall (2006): Stochastic flows associated to coalescent processes III: Limit theorems. *Illinois J. Math.* **50**, 147–181.
- [2] D. Dawson and Z. Li (2012): Stochastic equations, flows and measure-valued processes. *Ann. Probab.* **40**, 813–857.