

LlogL condition for superdiffusions and branching diffusions

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Abstract

In 1995, Lyons et al.(1995) used a method called martingale change of measure to give a probabilistic proof of the LlogL theorem of Kesten and Stigum (1966) for branching processes in single type case. Later this method were extended to branching processes in multiple and general multiple type cases (see Kertz et al. (1997); Lyons(1997); Biggins et al. (2004)). We extend their methods to supercritical superdiffusions and supercritical branching diffusions to establish an Kesten-Stigum type (LlogL) theorem for superdiffusions and branching diffusions.

The Kesten-Stigum type theorem is established under the assumption that the principle eigenvalue of some associated Schrodinger operator is positive. Our approach uses the principal eigenvalue and the ground state for the associated Schrodinger operator.