

# Branching diffusions in random environment

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We consider the diffusion approximation of branching processes in random environment (BPRES). This diffusion approximation is similar to and mathematically more tractable than BPRES. We obtain the exact asymptotic behavior of the survival probability. As in the case of BPRES, there is a phase transition in the subcritical regime due to different survival opportunities. In addition, we characterize the process conditioned to never go extinct and establish a backbone construction. In the strongly subcritical regime, mean offspring numbers are increased but still subcritical in the process conditioned to never go extinct. Here survival is solely due to an immortal individual, whose offspring are the ancestors of additional families. In the weakly subcritical regime, the mean offspring number is supercritical in the process conditioned to never go extinct. Thus this process survives with positive probability even if there was no immortal individual.

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