

Convergence of the immigration-branching process and conditional least-squares

I. RAHIMOV

*Department of Mathematical Sciences, KFUPM,
Box. 1339, Dhahran, 31261, Saudi Arabia
e-mail: rahimov @kfupm.edu.sa*

Abstract

We consider a discrete time branching process with non-homogeneous immigration. It was known that in critical or nearly critical case the conditional least squares estimate (CLSE) for the offspring mean is not asymptotically normal. However, when the process is nearly critical and the offspring variance tends to zero, it has a normal limiting distribution. We show that in the case of non-homogeneous immigration the CLSE may be asymptotically normal for the process with non-degenerate offspring distribution as well. In order to do it first we prove functional limit theorems for centered and normalized process. The limiting processes are deterministically time-changed Wiener with three different covariance functions depending on the behavior of the mean and variance of the number of immigrants.

AMS 2000 Subject Classification: Primary 60J80, Secondary 62F12, 60G99.
Key Words: branching process, immigration, functional, martingale limit theorem, Skorokhod space, least squares estimator.