Asymptotic Behavior of Some Galton-Watson Processes with Inhomogeneous Immigration

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We study the asymptotic behavior of a sequence of Galton–Watson processes with inhomogeneous immigration when the limit of the means of the offspring distributions is less than one or equals one. Under growth conditions on the expected values of the immigration distributions and the variances of the offspring distributions, and assuming the weak convergence of properly scaled immigration processes towards a non-negative stochastic process $\mathcal{Y}$ with càdlàg or continuous sample paths, we establish functional limit theorems for the sequence of Galton–Watson processes with immigration in question. The limit stochastic processes can be represented as a constant multiple or an integral functional of $\mathcal{Y}$.

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