Macroscopic and microscopic structures of the family tree for decomposable branching processes

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Abstract

A decomposable strongly critical Galton-Watson branching process with N types of particles labelled $1, 2, ..., N$ is considered in which a type i parent may produce individuals of types $j \geq i$ only. This model may be viewed as a stochastic model for the sizes of a geographically structured population occupying N islands, the location of a particle being considered as its type. The newborn particles of island $i \leq N-1$ either stay at the same island or migrate, just after their birth to the islands $i+1, i+2, ..., N$. Particles of island N do not migrate. We investigate the structure of the family tree for this process, the distributions of the birth moment and the type of the most recent common ancestor of the individuals existing in the population at a distant moment n.