2·2. *Construction of the transition matrix*

In order to use this method for a given distribution $\boldsymbol{\pi}$, we must construct a Markov chain $\mathbf{P}$ with $\boldsymbol{\pi}$ as its stationary distribution. We now describe a general procedure for doing this which contains as special cases the methods which have been used for problems in statistical mechanics, in those cases where the matrix $\mathbf{P}$ was made to satisfy the reversibility condition that for all i and j

$$\pi_i p_{ij} = \pi_j p_{ji}. \tag{4}$$

The property ensures that $\Sigma \pi_i p_{ij} = \pi_j$, for all j, and hence that $\boldsymbol{\pi}$ is a stationary distribution of $\mathbf{P}$. The irreducibility of $\mathbf{P}$ must be checked in each specific application. It is only necessary to check that there is a positive probability of going from state i to state j in some finite number of transitions, for all pairs of states i and j.

We assume that p_{ij} has the form

$$p_{ij} = q_{ij}\alpha_{ij} \quad (i \neq j), \tag{5}$$

with

$$p_{ii} = 1 - \sum_{j \neq i} p_{ij},$$

where $\mathbf{Q} = \{q_{ij}\}$ is the transition matrix of an arbitrary Markov chain on the states $0, 1, \ldots, S$ and α_{ij} is given by

$$\alpha_{ij} = \frac{s_{ij}}{1 + \dfrac{\pi_i}{\pi_j}\dfrac{q_{ij}}{q_{ji}}}, \tag{6}$$