Due to different moisture inflows, the rainfall differences between windward slopes and leeward slopes are larger. Based on this understanding, the time-interval orographic enhancement factor method was used (Lin, 1988). The method estimates orographic rains at different time intervals using statistics of observed storms at different time intervals.

In the actual estimation, the average orographic enhancement factor $\bar{f}_{\Delta t}(x,y)$ was calculated using the following equation:

$$\bar{f}_{\Delta t}(x,y) \approx \frac{\bar{R}_{\Delta t}(x,y)}{\bar{R}_{0\Delta t}} \tag{6.1}$$

where $\bar{R}_{\Delta t}(x,y)$ is the multi-year average of observed rainfalls at the point (x, y) in the time interval Δt; $\bar{R}_{0\Delta t}$ is the average convergence component of storms in the time interval Δt.

The convergence component of storms at the point (x, y) in the time interval Δt can be expressed as:

$$R_{0\Delta t}(x,y) \approx \frac{R_{\Delta t}(x,y)}{\bar{f}_{\Delta t}(x,y)} \tag{6.2}$$

where $R_{0\Delta t}(x, y)$ is the convergence component of storms at the point (x, y) in the Δt time interval; $R_{\Delta t}(x, y)$ is the actual storm rainfall at the point (x, y) in the time interval Δt; $\bar{f}_{\Delta t}(x,y)$ is the average orographic enhancement factor at the point (x, y) for the Δt time interval.

Thus, according to the size and the shape of the drainage in question and the number of the rain gauge stations available in the drainage a denser grid of calculation was formed in such a way to cover the drainage completely. Now, the area-averaged PMP for a drainage and for a period of Δt can be written as:

$$PMP_{\Delta t,A} = \frac{1}{m \times n - k} \sum_{1}^{m} \sum_{j}^{n} PMP_{0,\Delta t}(x_i, y_i) \cdot \bar{f}_{\Delta t}(x_i, y_i)$$

where the $PMP_{0\Delta t}(x_i,y_t)$ represents the contribution of a node in the drainage in Δt time to the area-averaged convergence PMP when the PMP occurs (note, here the $PMP_{0\Delta t}(x_i,y_t)$ is not equal to the point-PMP(x_i,y_t) of the node), while m and n are the numbers of Δx_i and Δx_t respectively, and the k value is the number of nodes which are located outside the drainage.

When estimating PMP for the Daguangba watershed of the Changhuajiang River, isoline maps (Ye and Hu, 1979) of averages of the annual maximum 6-h, 21-, 24-hour and 3-day point storms in China were used to compute the average orographic enhancement factor $\bar{f}_{\Delta t}(x,y)$. A number of rainfall stations without apparent orographic disturbances were identified in the storm moisture inflow direction where the storm occurred. The annual maximum rainfall averages in the time interval Δt for these stations were used to calculate the average for the group of stations.

In this instance, 11 × 7 = 77 nodes (see Figure 6.25) were set up surrounding the centre of the Changhuajiang River basin. Five rainfall stations in flat coastal regions west and south of the basin were selected to be comparison stations for studying the enhancement effects of orography. Averages of the annual maximum 6-, 12- and 24-hour rainfall extremes of 72 nodes were calculated. The calculated values of the nodes were compared with the group-station averages of the selected five stations, and time-interval orographic enhancement factors of all the time intervals and nodes were obtained. Results of the calculation showed that average enhancement extents of the orography of the Daguangba watershed for 6-, 12- and 24-hour storms were 8.7, 14.6 and 22.1 per cent, respectively. Within 24 hours, the orographic enhancement effect on storms increased with storm duration.

6.2.5.3 DAD relations of PMP for non-orographic regions on Hainan Island

Data from the following three areas were considered:

(a) Data on the watershed: analysis of 15 typhoon storms affecting the Changhuajiang River basin, and meteorological data, showed three storm centres in the Daguangba watershed. They were in Sanpai in the lower reaches, Qilinchang in the middle reaches and Baoguo in the upper reaches. Moisture inflows were

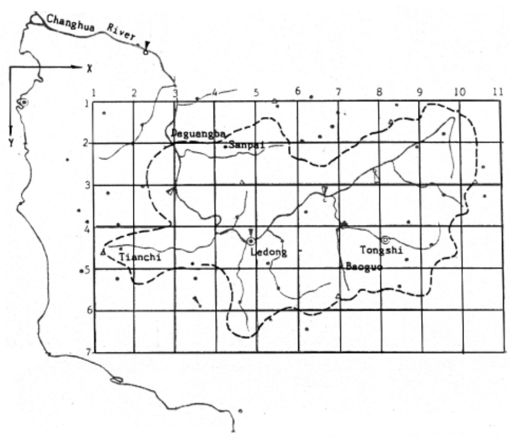

Figure 6.25. Calculation grids of Changhuajiang River Basin (Lin, 1988)