dependence incident irradiance. It follows that the mean power they deliver during a period of time tends to be equal to the delivered power when they are illuminated with the mean irradiance during such time. Second-order effects, associated to ambient temperature or operation voltage fluctuations, do not significantly alter this idea, provided that they are adequately considered, as discussed afterwards. Because of that, rather few benefits, in terms of long-term performance predictions, should be expected from analysing all the days of a month instead of only the mean day of such a month. The reason for the popularity of individual day analysis in recently available software tools, lies more with fashion and prestige than with increasing energy yield prediction certainty.

Figure 20.12 shows the experimental values of $F_{Dd} = D_d(0)/G_d(0)$ versus $K_{Td} = G_d(0)/B_{0d}(0)$, obtained in Madrid, from 1977 to 1988. Each point derives from the simultaneous measurement of the diffuse and the global horizontal irradiation along a particular day. Note that the general trend is consistent with the principle that the clearer the atmosphere, the lower the diffuse content. A third-order or fourth-order polynomial in K_{Td} is generally used to model the diffuse fraction F_{Dd}. A correlation between F_{Dd} and K_{Td} was first developed by Liu and Jordan [19]. However, it was derived from diffuse radiation data that were not compensated for by shadow-band effects (the shadow band is a device added to a pyranometer, to exclude the direct radiation from the sun. Hence, it allows for the measurement of diffuse radiation. However, the shadow-band screens the sensor not only from the sun but also from a portion of the diffuse radiation coming in from the sky, so that, a correction must be made to the measurement). Not surprisingly, later revisions by other authors concluded that the Liu and Jordan correlation underestimates diffuse radiation.

The most frequently referred correlation for daily values is that put forward by Collares Pereira and Rabl [21], using data from five stations located in the United States. It is expressed as

$$F_{Dd} = 0.99 \text{ for } K_{Td} \leq 0.17$$
$$F_{Dd} = 1.188 - 2.272K_{Td} + 9.473{K_{Td}}^2 - 21.856{K_{Td}}^3 + 14.648{K_{Td}}^4 \qquad (20.19)$$

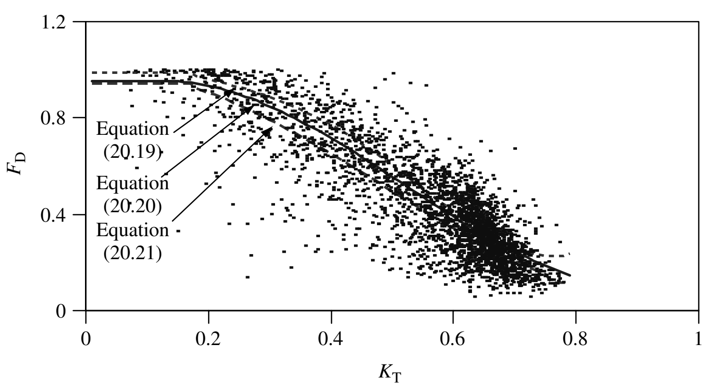

Figure 20.12 The diffuse fraction of the individual daily global irradiation F_{Dd} is plotted against the clearness index K_{Td}. The cluster of points refers to measured values in Madrid from 1977 to 1988