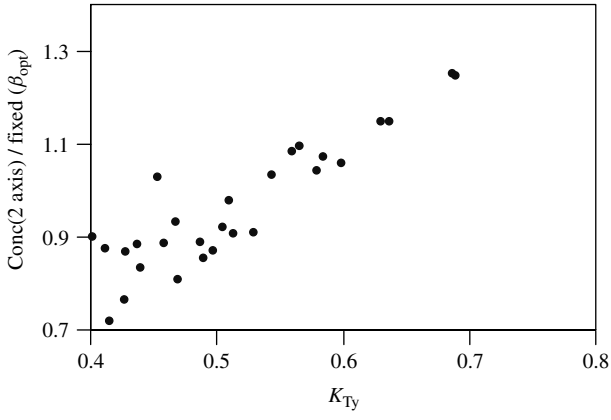

Figure 20.21 Comparison of annual average solar radiation available for fixed flat-plate conventional PV modules, and two-axis tracking PV concentrators. The y-axis is (column 10)/(column 9) and the x-axis column 4 of Table 20.5

sites with low scattering (or low diffuse radiation) and good solar resources. Figure 20.21 compares the amount of normal direct radiation for a PV concentrator mounted on a two-axis tracker, with the amount of global radiation, collected by a conventional flat-plate PV collector, at a fixed optimal tilt. The data represents the 30 locations in Table 20.5. The ratio between both quantities, $B_{dy}(\perp)/G_{dy}(\beta_{opt})$, (column 9 divided by column 8 of Table 20.5) is plotted against the annual clearness index. As a general rule, two-axis tracking concentrators collect more radiation than fixed flat-plate modules in places where $K_{Ty} > 0.55$.

20.10 PV GENERATOR BEHAVIOUR UNDER REAL OPERATION CONDITIONS

A problem that the engineer frequently has to solve is the prediction of the electrical behaviour of a PV generator, given the information about the generator's construction, geographic location, and the local weather. In particular, this represents the base for predicting the generator energy delivery, which is a critical step of any PV-system design. This leads to the question of establishing a PV module rating condition, at which power performance and other characteristics are specified and, defining a method for calculating performance at the prevailing environmental conditions such as solar irradiance, ambient temperature, wind speed and so on.

Traditionally, PV modules are being rated under the so-called Standard Test Conditions (STC) (Irradiance: 1000 W/m^2; Spectrum: *AM* 1.5; and Cell Temperature: 25°C). In the following, we will use the superscript * to refer to these conditions. The most usual case is to know just the values of the short-circuit current, I^*_{SC}, the open-circuit voltage, V^*_{OC} and the maximum power, P^*_M, which are always included in the manufacturer's data sheets. Furthermore, the characterisation of the PV module is completed by measuring the *nominal operating cell temperature* (*NOCT*), defined as the temperature reached by the cells when the PV module is submitted to an irradiance of 800 W/m^2 and