It is useful to first introduce the model's grid configuration. The modeling system usually gets and analyzes its data on pressure surfaces, but these have to be interpolated to the model's vertical coordinate before being input to the model. The vertical coordinate is terrain following (see Fig. 1.2) meaning that the lower grid levels follow the terrain while the upper surface is flat. Intermediate levels progressively flatten as the pressure decreases toward the chosen top pressure. A dimensionless quantity σ is used to define the model levels where

$$\sigma = (p - p_t)/(p_s - p_t) \tag{1.1}$$

p is the pressure, p_t is a specified constant top pressure, p_s is the surface pressure.

As described in a later section, the nonhydrostatic model coordinate uses a reference-state pressure to define the coordinate rather than the actual pressure which is used in the hydrostatic model. It can be seen from the equation and Fig 1.2 that σ is zero at the top and one at the surface, and each model level is defined by a value of σ. The model vertical resolution is defined by a list of values between zero and one that do not necessarily have to be evenly spaced. Commonly the resolution in the boundary layer is much finer than above, and the number of levels may vary from ten to forty, although there is no limit in principle.

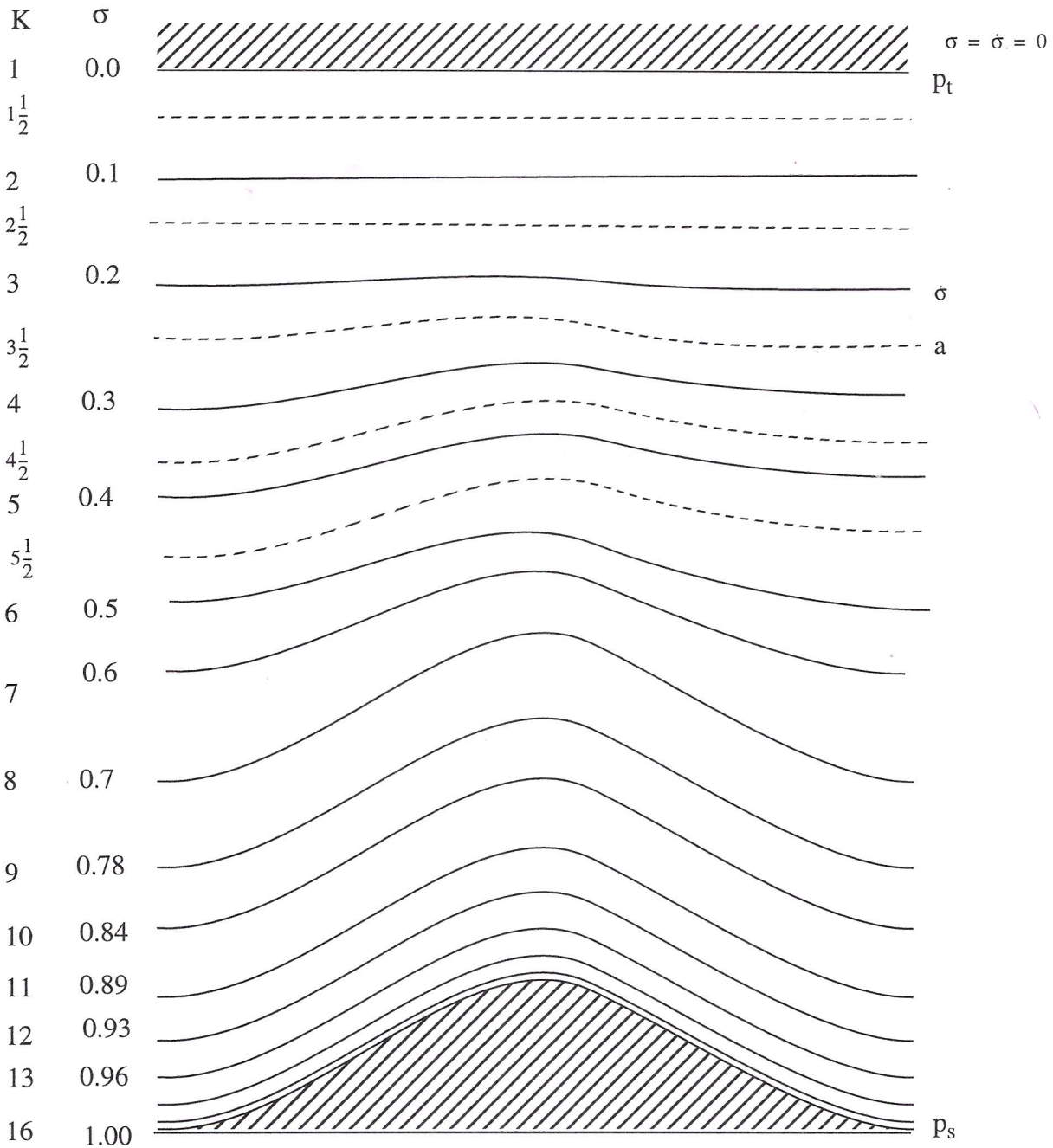

Figure 1.2 Schematic representation of the vertical structure of the model. The example is for 15 vertical layers. Dashed lines denote half-sigma levels, solid lines denote full-sigma levels.