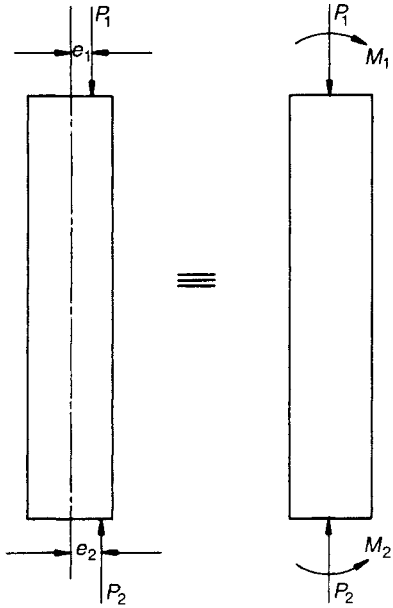

Fig. 5.2 Eccentric axial loading.

on the slenderness ratio and the eccentricity, and the equation for calculating the tabular values is given in Appendix B1 of the code as:

$$\beta = 1.1\,(1 - 2\,e_m / t) \qquad (5.1)$$

where e_m is the larger value of e_x, the eccentricity at the top of the wall, and e_t, the eccentricity in the mid-height region of the wall. Values of e_t are given by the equation:

$$e_t = 0.6e_x + e_a = 0.6e_x + t\,[(1/2400)\,(h_{ef}/t)^2 - 0.015] \qquad (5.2)$$

where (h_{ef}/t) is the slenderness ratio (section 5.4) and e_a represents an additional eccentricity to allow for the effects of slenderness.

A graph showing the variation of β with slenderness ratio and eccentricity was shown previously in Fig. 4.4 and further details of the method used for calculating β are given in sections 5.6.2 and 5.9.

5.3.2 ENV 1996–1–1

A similar approach is used in the Eurocode, ENV 1996–1–1, except that a capacity reduction factor Φ is used instead of β. The effects of slenderness and eccentricity of loading are allowed for in both Φ and β but in a slightly different way. In the Eurocode, values of Φ_i at the top (or bottom) of the wall are defined by an equation similar to that given in BS 5628 whilst values of Φ_m in the mid-height region are determined from a set of curves (Fig. 4.6).

1. At the top (or bottom) of the wall values of Φ are defined by

$$\Phi_i = 1 - 2\,(e_i/t) \tag{5.3}$$

   where

$$e_i = M_i/N_i + e_{hi} + e_a \geqslant 0.05t \tag{5.4}$$

   where, with reference to the top (or bottom) of the wall, M_i is the design bending moment, N_i the design vertical load, e_{hi} the eccentricity resulting from horizontal loads, e_a the accidental eccentricity and t the wall thickness. The accidental eccentricity e_a, which allows for construction imperfections, is assumed to be $h_{ef}/450$ where h_{ef} is the effective height. The value 450, representing an average 'category of execution', can be changed to reflect a value more appropriate to a particular country.
2. For the middle fifth of the wall Φ_m can be determined from Fig. 4.6 using values of h_{ef}/t_{ef} and e_{mk}/t. Figure 4.6, used in EC6, is equivalent to Fig. 4.4, used in BS 5628, to obtain values of Φ and $ß$ respectively. The value of e_{mk} is obtained from:

$$e_{mk} = M_m/N_m + e_{hm} \pm e_a + e_k \geqslant 0.005t \tag{5.5}$$

   where, with reference to the middle one-fifth of the wall height, M_m is the design bending moment, N_m the design vertical load, e_{hm} the eccentricity resulting from horizontal loads and e_k the creep eccentricity defined by

$$e_k = 0.002\Phi_\infty\,(h_{ef}/t_m)\,(te_m)^{1/2}$$

   where Φ_∞ is a final creep coefficient obtained from a table given in the code. However, the value of e_k can be taken as zero for all walls built with clay and natural stone units and for walls having a slenderness ratio up to 15 constructed from other masonry units.

Note that the notation e_a used in EC6 is not the same quantity e_a used in BS 5628. They are defined and calculated differently in the two codes.

5.4 SLENDERNESS RATIO

This is the ratio of the effective height to the effective thickness, and therefore both of these quantities must be determined for design purposes. The maximum slenderness ratio permitted according to both BS 5628 and ENV 1996–1–1 is 27.