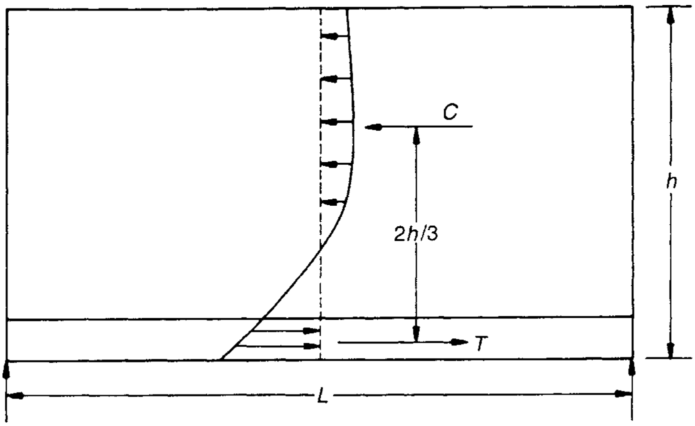

Fig. 8.3 Moment capacity of wall-beam.

that the ratio of h/L was equal to 0.6 and that this was representative of walls for which the actual h/L value was greater.

Conservative estimates of the stresses in walls on beam structures with restrained or free ends based on the above are:

$$\text{maximum moment in beam} = PL/4\ (E_w\ tL^3/E_{bm}\ I_b)^{1/3} \tag{8.3}$$

$$\text{maximum tie force in beam} = P/3.4 \tag{8.4}$$

$$\text{maximum stress in wall} = 1.63(P/Lt)\ (E_w\ tL^3/E_{bm}\ I_b)^{0.28} \tag{8.5}$$

Note that assuming $h/L=0.6$, equation (8.1) above becomes $T=P/3.2$ which is similar to equation (8.4).

In 1980 an approximate method of analysis based on a graphical approach was introduced. This method is described in section 8.1.4.

8.1.3 Basic assumptions

The walls considered are built of brickwork or blockwork and the beams of concrete or steel. It is assumed that there is sufficient bond between the wall and the beam to carry the shear stress at the interface, and this presupposes that a steel beam would be encased and the ratio of h/L would be $\geqslant 0.6$.

The loading, including the self-weight of the wall, is represented by a istributed load along the top surface. Care must be taken with additional loads placed at beam level since the tensile forces that might result could destroy the composite action by reducing the frictional resistance.

Two stiffness parameters, R and K_1, are introduced to enable the appropriate stresses and moments to be determined. The first is a flexural stiffness parameter similar to that introduced by Stafford-Smith and Riddington (1977) except that the height of the wall replaces the span, and the second is an axial stiffness parameter used for determining the axial force in the beam:

$$R = (E_w th^3 / E_{bm} I_b)^{1/4} \tag{8.6}$$

$$K_1 = E_w th / E_{bm} A_b \tag{8.7}$$

A typical vertical stress distribution at the wall-beam interface is shown in Fig. 8.2(a). To simplify the analysis it is assumed that the distribution of this stress can be represented by a straight line, a parabola or a cubic parabola depending on the range of R shown in Fig. 8.4.

The axial force in the beam is assumed to be linear with a maximum value at the centre and zero at the supports.

8.1.4 The graphical method

(a) Maximum vertical stress in wall (f_m)

This stress is a maximum over the supports and can be determined using the equation

$$f_m = (P/L\,t)\,C_1 \tag{8.8}$$

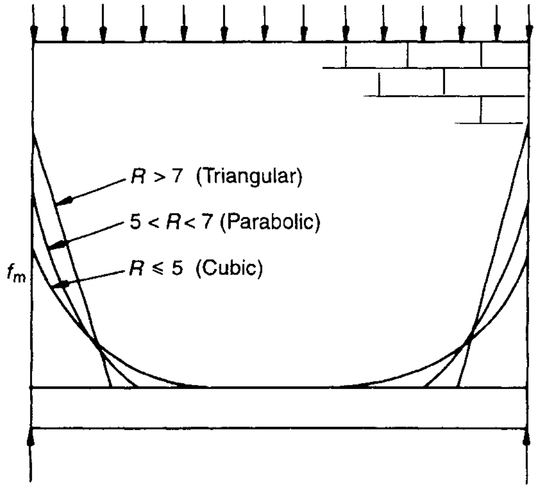

Fig. 8.4 Vertical stress distribution.