Singularity Functions

Notice that the argument of a singularity function is enclosed by angle brackets (*i.e.*, $< >$). The argument of a regular function continues to be enclosed by parentheses [*i.e.*, ( )]. The rudiments of singularity functions include the following:

$$<x-a>^n = (x-a)^n \quad \text{if} \quad x-a \geq 0 \quad \text{and} \quad n>0$$

$$<x-a>^n = 1 \quad \text{if} \quad x-a \geq 0 \quad \text{and} \quad n \leq 0$$

$$<x-a>^n = 0 \quad \text{if} \quad x-a < 0 \quad \text{or} \quad n<0$$

$$\int_{-\infty}^{x} <x-a>^n \, dx = \frac{1}{n+1} <x-a>^{n+1} \quad \text{if} \quad n>0$$

$$\int_{-\infty}^{x} <x-a>^n \, dx = <x-a>^{n+1} \quad \text{if} \quad n \leq 0$$

$$\frac{d}{dx} <x-a>^n = n <x-a>^{n-1} \quad \text{if} \quad n>0$$

$$\frac{d}{dx} <x-a>^n = <x-a>^{n-1} \quad \text{if} \quad n \leq 0$$

The equations above imply that, in using singularity functions for beams, we take

$$b^0 = 1 \quad \text{for} \quad b \geq 0$$
$$b^0 = 0 \quad \text{for} \quad b < 0$$

Loading Function q for Beam ab Under Loading

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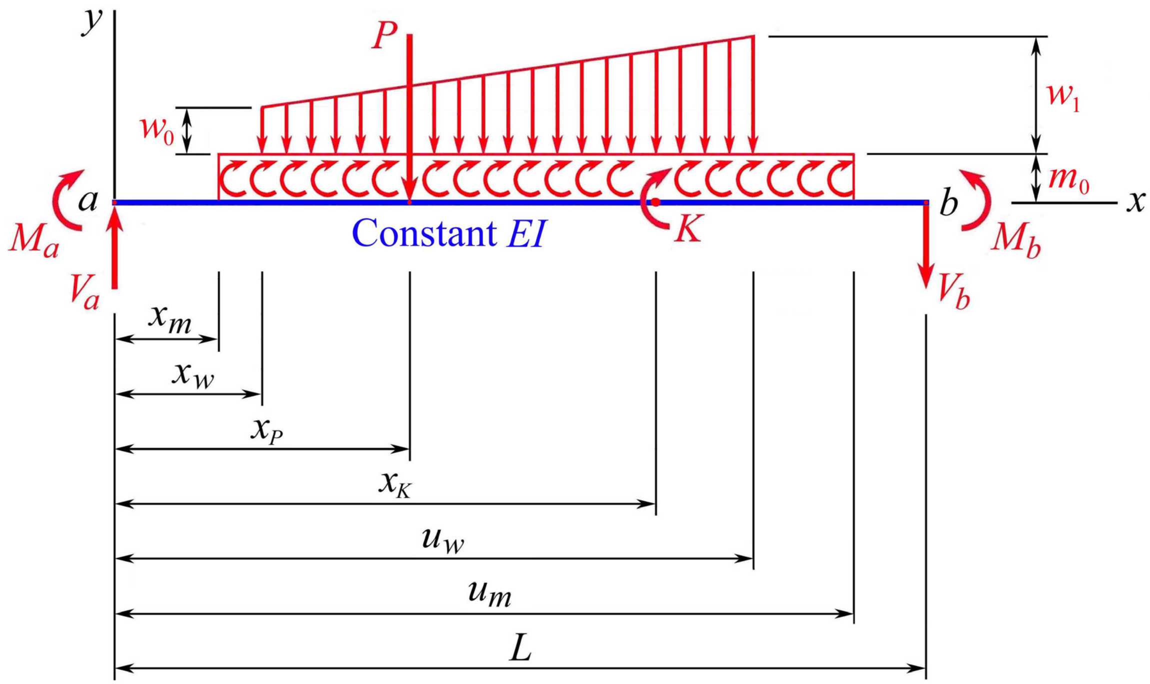

$$q = V_a < x >^{-1} + M_a < x >^{-2} - P < x - x_P >^{-1} + K < x - x_K >^{-2} - w_0 < x - x_w >^0$$
$$- \frac{w_1 - w_0}{u_w - x_w} < x - x_w >^1 + w_1 < x - u_w >^0 + \frac{w_1 - w_0}{u_w - x_w} < x - u_w >^1$$
$$+ m_0 < x - x_m >^{-1} - m_0 < x - u_m >^{-1}$$