Ministerstwo Nauki i Szkolnictwa Wyższego

Organizacja IX Konferencji Modelowanie Matematyczne w Fizyce i Technice (MMFT 2017)
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ze środków Ministra Nauki i Szkolnictwa Wyższego przeznaczonych na działalność upowszechniającą naukę.

AN INFLUENCE OF THE PARAMETERS OF LOADING HEADS ON THE LOADING CAPACITY OF A DAMAGED COLUMN SUBJECTED TO A SPECIFIC LOAD

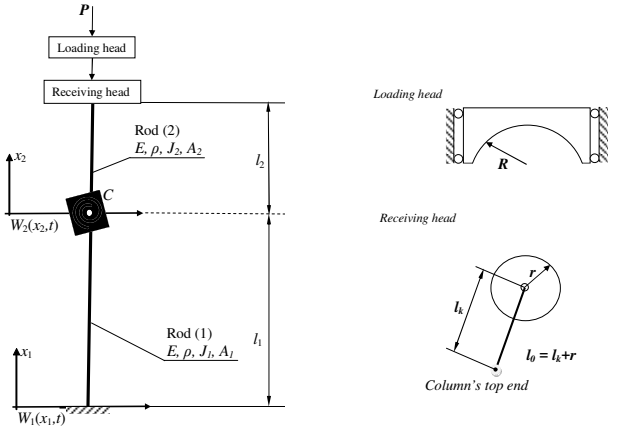

Fig. 1 The investigated column and shapes of heads

Boundary conditions

$$W_2(0)=W_1(l_1) \qquad W_1(0)=\left.\frac{dW_1(x_1)}{dx_1}\right|_{x_1=0}=0$$

$$-EJ_2\left.\frac{d^2W_2(x_2)}{dx_2^2}\right|_{x_2=0}+C\left[\left.\frac{dW_2(x_2)}{dx_2}\right|_{x_2=0}-\left.\frac{dW_1(x_1)}{dx_1}\right|^{x_1=l_1}\right]=0$$

$$EJ_1\left.\frac{d^2W_1(x_1)}{dx_1^2}\right|^{x_1=l_1}-C\left[\left.\frac{dW_2(x_2)}{dx_2}\right|_{x_2=0}-\left.\frac{dW_1(x_1)}{dx_1}\right|^{x_1=l_1}\right]=0$$

$$EJ_2\left.\frac{d^2W_2(x_2)}{dx_2^2}\right|^{x_2=l_2}+P\frac{r-l_0}{R-r}\zeta=0$$

$$EJ_1\left.\frac{d^3W_1(x_1)}{dx_1^3}\right|^{x_1=l_1}+P\left.\frac{dW_1(x_1)}{dx_2}\right|^{x_1=l_1}-EJ_2\left.\frac{d^3W_2(x_2)}{dx_2^3}\right|_{x_2=0}+P\left.\frac{dW_2(x_2)}{dx_2}\right|_{x_2=0}=0$$

$$EJ_2\left.\frac{d^3W_2(x_2)}{dx_2^3}\right|^{x_2=l_2}+P\frac{1}{R-r}\zeta=0 \qquad \zeta=\left.\frac{dW_2(x_2)}{dx_2}\right|^{x_2=l_2}(R-l_0)-W_2(l_2)$$

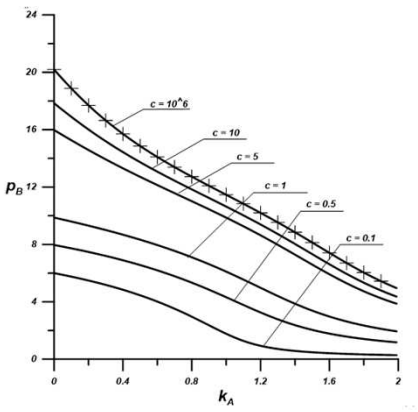

Fig. 2 An influence of k_A parameter on the loading capacity at different crack size; $k_B = 0.2$, $k_C = 0.5$, $\mu = 1$

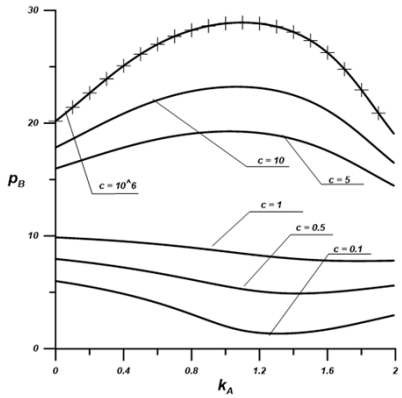

Fig. 3 An influence of k_A parameter on the loading capacity at different crack size; $k_B = 0.8$, $k_C = 0.5$, $\mu = 1$

$$p_B=\frac{Pl^2}{EJ_1} \qquad c=\frac{Cl}{EJ_1}$$

$$k_A=\frac{R}{l} \qquad k_B=\frac{r}{R} \qquad k_C=\frac{l_k}{R}$$

$$\mu=\frac{EJ_2}{EJ_1} \qquad d=\frac{l_2}{l}$$

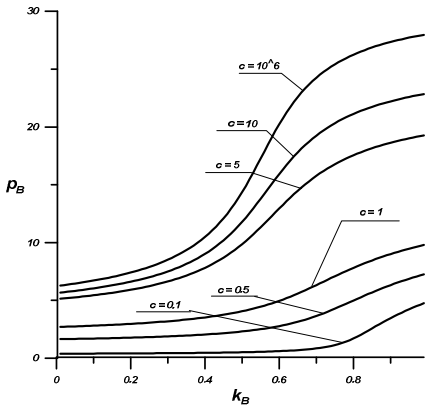

Fig. 4 An influence of k_B parameter on the loading capacity at different crack size; $k_A = 1.6$, $k_C = 0.5$, $\mu = 1$

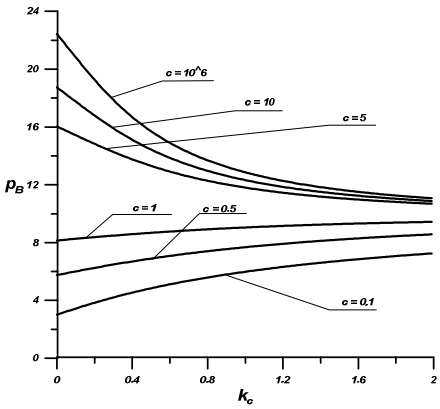

Fig. 5 An influence of k_C parameter on the loading capacity at different crack size; $k_A = 0.4$, $k_B = 0.2$, $\mu = 1$

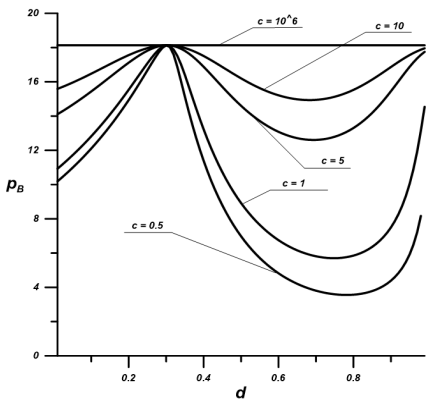

Fig. 6 An influence of crack location on the loading capacity at different c; $k_A = 0.4$, $k_B = 0.4$, $k_C = 0.5$, $\mu = 1$