

Highway Engineering II
Exercises I

1. For homogenous half space subjected to two circular loads shown below, determine the vertical stress, strain and deflection at point A, which is located 25.4cm below the center of one circle.



Stress at A due to the left loading

Vertical Stress

$$\frac{r}{a} = 0 \text{ and } \frac{z}{a} = \frac{25.4}{(25.4/2)} = 2$$

$$\Rightarrow \frac{\delta_z}{q} * 100 = 28 \dots \dots \dots \text{from graph 2.2}$$

$$\Rightarrow \delta_z = \frac{28}{100} * 350 \text{ kPa} = 98 \text{ kPa}$$

Radial stress

$$\frac{r}{a} = 0, \text{ and } \frac{z}{a} = \frac{25.4}{(25.4/2)} = 2 \Rightarrow \frac{\delta_r}{q} * 100 = 1.6 \dots \dots \dots \text{from graph 2.3}$$

$$\Rightarrow \delta_r = 5.6 \text{ kPa}$$

Tangential stress

$$\frac{r}{a} = 0, \text{ and } \frac{z}{a} = \frac{25.4}{(25.4/2)} = 2 \Rightarrow \delta_t = 5.6 \text{ kPa} \dots \dots \dots \text{from graph 2.4}$$

Stress at A due to the right loading

Vertical stress

$$\frac{r}{a} = \frac{50.8}{(25.4/2)} = 4, \text{ and } \frac{z}{a} = 2$$

$$\frac{\delta_z}{q} * 100 = 0.76 \Rightarrow \delta_z = 2.66 \text{ kPa} \dots \dots \dots \text{from graph 2.2}$$

Radial stress

$$\frac{\delta_r}{q} * 100 = 2.6 \Rightarrow \delta_r = 9.1 \text{ kPa} \dots \dots \dots \text{from graph 2.3}$$

Highway Engineering Solved Problems

Hussin A.Rothana



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