Title :

Selection of ball and cylindrical roller bearings

△ Radial load F_r

C_{10}

△ Radial load F_r + Thrust load F_a

equivalent radial load : $F_e = X_i V F_r + Y_i F_a$

△ procedure

- assuming $\dfrac{F_a}{V F_r} > e$

1). choose Y_2 from Table 11.1

2). Find C_{10}

3). get a suitable bearing fran Table 11.2 , note C_0 .

4). using $\dfrac{F_a}{C_0}$ to get new Y_2 , and find C_{10} again .

5). if same , done

6). if not , do them again .

without reliability factor

$$C_{10} = F_R = F_D \left(\frac{L_D}{L_R}\right)^{1/a} = F_D \left(\frac{\mathcal{L}_D n_D 60}{\mathcal{L}_R n_R 60}\right)^{1/a}$$

reliability R_D

$$C_{10} = a_f F_D \left(\frac{x_D}{x_0 + (\theta - x_0)(1 - R_D)^{1/b}}\right)^{1/a}$$

> ball bearing

$a = 3$

> roller bearing

$a = \dfrac{10}{3}$

$$x_D = \frac{L_D}{L_R} = \frac{L_D}{L_{10}} = \frac{L_D\, n_D \cdot 60}{L_R\, n_R \cdot 60}$$

Selection of tapered roller bearings

Title :

△ equivalent radial load F_{ea}

∘ $F_{iA} > F_{iB} + F_{ae}$

$$\begin{cases} F_{eA} = 0.4 F_{rA} + K_A (F_{iB} + F_{ae}) \\ F_{eB} = F_{rB} \end{cases}$$

- radial bearing
  $K = 1.5$
- steep angle bearing
  $K = 0.75$

∘ $F_{iA} < F_{iB} + F_{ae}$

$$\begin{cases} F_{eB} = 0.4 F_{rB} + K_B (F_{iA} - F_{ae}) \\ F_{eA} = F_{rA} \end{cases}$$

without reliability factor

$$C_{10} = F_R = F_D \left(\frac{L_D}{L_R}\right)^{1/a} = F_D \left(\frac{\mathcal{L}_D n_D 60}{\mathcal{L}_R n_R 60}\right)^{1/a}$$

reliability R_D

$$C_{10} = a_f F_D \left(\frac{x_D}{x_0 + (\theta - x_0)(1 - R_D)^{1/b}}\right)^{1/a}$$

> ball bearing

$a = 3$

> roller bearing

$a = \frac{10}{3}$

$$x_D = \frac{L_D}{L_R} = \frac{L_D}{L_{10}} = \frac{L_D n_D \cdot 60}{L_R n_R \cdot 60}$$