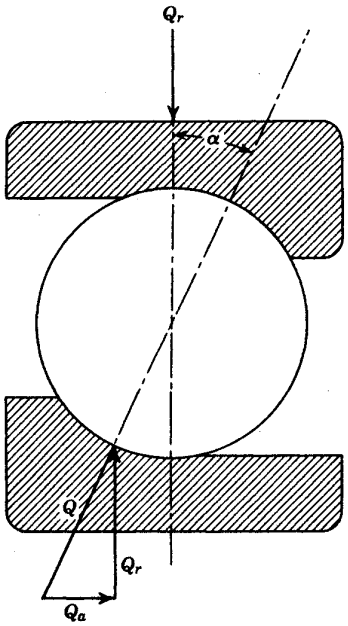
# *Example 5.1* Induced Ball Radial Load due to Applied Axial Load




## Problem Statement

**The 209 DGBB is subjected to a thrust (axial) load of 445 N per ball. What is the magnitude of the radial load induced in each ball assuming the contact angle* is not changed by the application of load?**

## Problem Solution

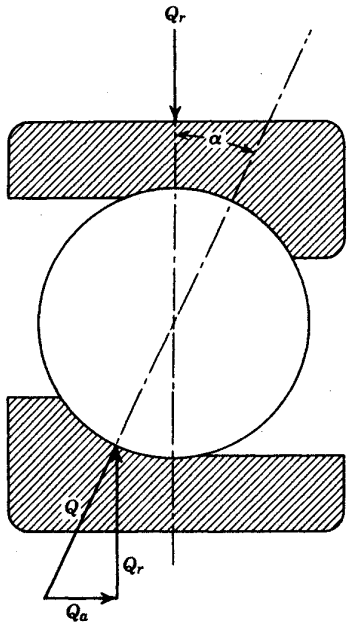
**Ex. (3.1)** $\alpha = 7°25' = 7.417°$

**Eq. (5.3)** $Q_a = Q_r \tan\alpha$

$$Q_r = \frac{Q_a}{\tan\alpha} = \frac{445}{\tan(7.417°)} = 3419N$$

*This assumption is not accurate in this case and is made only to illustrate a point.

# *Example 5.2* Normal Ball Load in Angular-Contact Ball Bearing Subjected to Applied Thrust Load




## Problem Statement

**The 218 ACBB of Ex. 3.3 is subjected to a thrust (axial) load of 2225 N per ball. What is the magnitude of the normal load induced in each ball assuming the contact angle is not changed* by the application of load?**

## Problem Solution

**Ex. (3.3)** $\alpha = 38°54' = 38.9°$

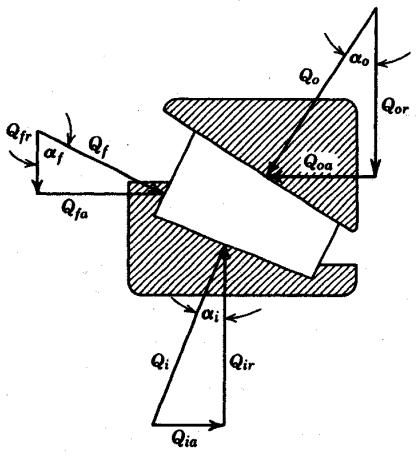
**Eq. (5.2)** $Q = Q_a \sin\alpha$

$$Q = \frac{Q_a}{\sin\alpha} = \frac{2225}{\tan(38.9°)} = 3543N$$

*This assumption is not accurate in this case and is made only to illustrate a point.

# *Example 5.3* Induced Tapered Roller End-Flange Load due to Applied Axial Load

## Problem Statement




**A 90000 series steep angle TRB has the following dimensions:**

$\alpha_i = 22°$

$\alpha_o = 29°$

$\alpha_f = 64°$ **(with bearing axis)**

$D = 22.86$ **mm**

$l = 30.48$ **mm**

**If the most heavily loaded roller supports a thrust of 22,250 N, what is the magnitude of the maximum load on the guide flange (large end rib)? Compare this load with the maximum normal load on the cone.**

## Problem Solution

**Eq. (5.14)** $$Q_f = Q_{ia}\frac{\left(\cot\alpha_i \sin\alpha_o - \cos\alpha_o\right)}{\sin\left(\alpha_o + \alpha_f\right)} = 22250\frac{\left(\cot 22° \sin 29° - \cos 29°\right)}{\sin\left(29° + 64°\right)} = 7245N$$

**Fig. 5.3** $$Q_i = \frac{Q_{ia}}{\sin\alpha_i} = \frac{22250}{\sin(22°)} = 59410N$$