Escola de Engenharia de São Carlos
Universidade de São Paulo

Revisão 2D
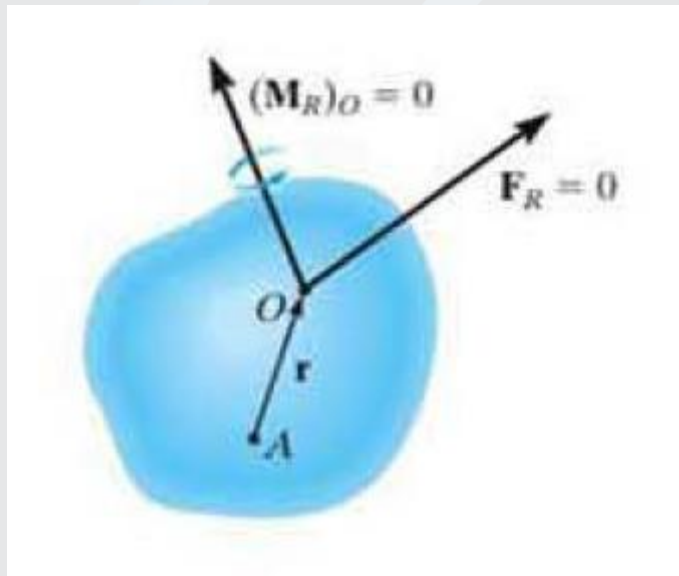
$$\Sigma M_A = r \times F_R + (M_R)_O = 0$$
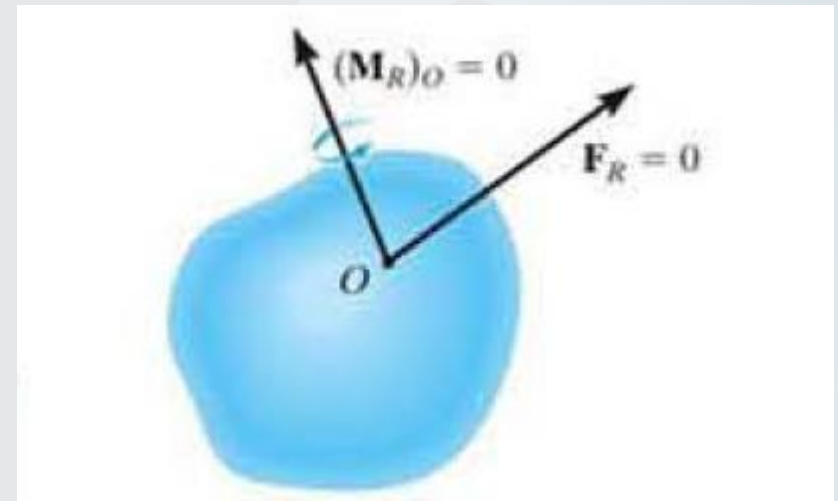
$$F_R = \Sigma F = 0$$

$$(M_R)_O = \Sigma M_O = 0$$

Revisão 2D

Elementos com DUAS FORÇAS

Two-force members
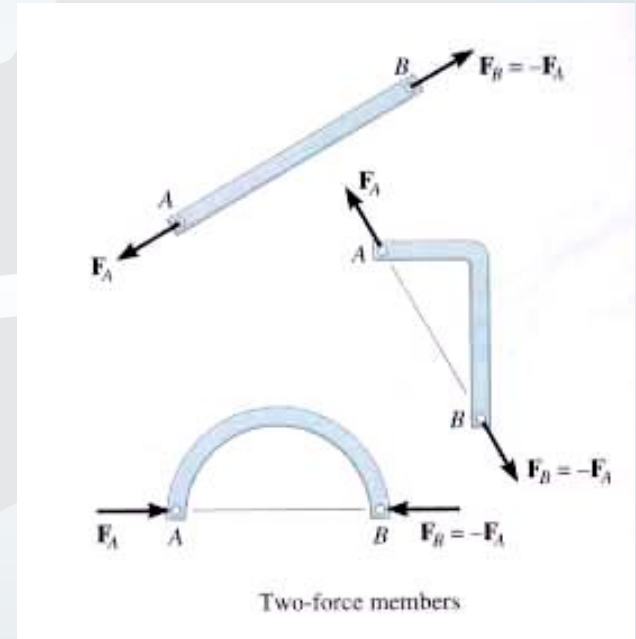
Exercício

Equilíbrio de Corpo Rígido 3D

SEM0500 - Estática

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3373-8650

DEPARTAMENTO DE ENGENHARIA MECÂNICA

Equilíbrio de Corpo Rígido
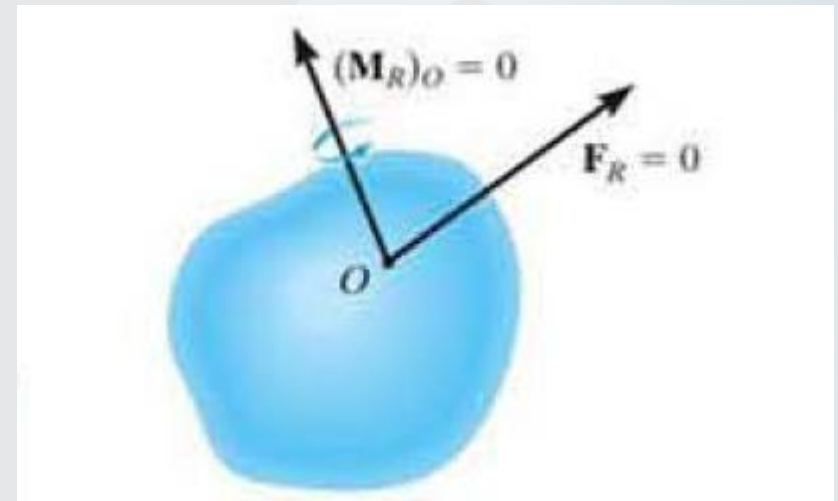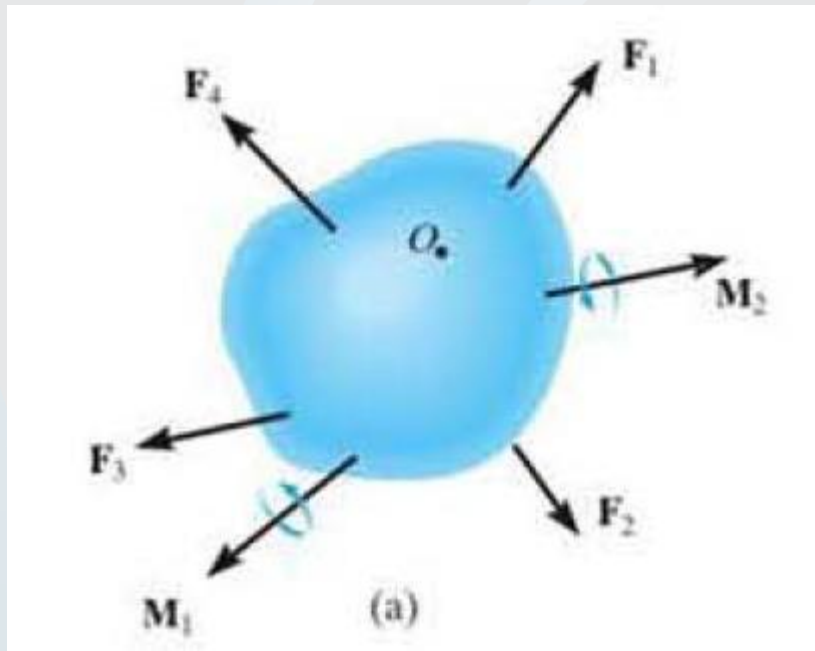
$$\mathbf{F}_R = \Sigma\mathbf{F} = 0$$

$$(\mathbf{M}_R)_O = \Sigma\mathbf{M}_O = 0$$

Apoios 3D

(1)

cable

One unknown. The reaction is a force which acts away from the member in the known direction of the cable.

(2)

smooth surface support

One unknown. The reaction is a force which acts perpendicular to the surface at the point of contact.

(3)

roller

One unknown. The reaction is a force which acts perpendicular to the surface at the point of contact.
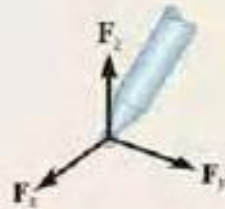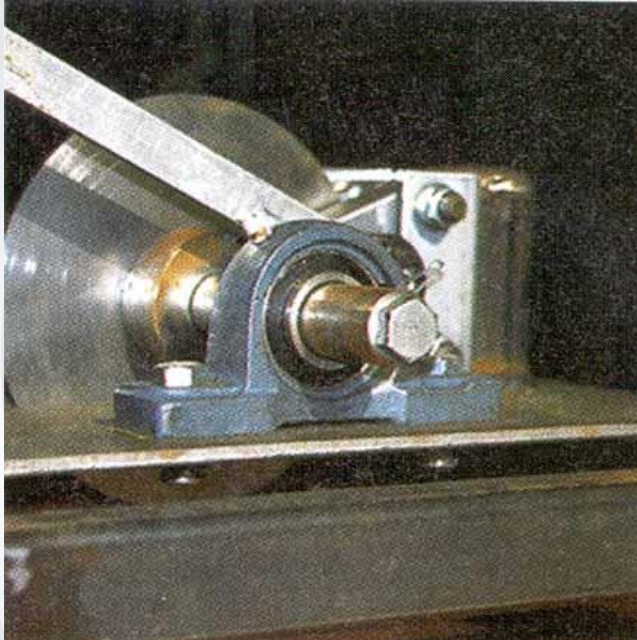
Apoios 3D

Junta Esférica

(4)

F_z

F_x F_y

Three unknowns. The reactions are three rectangular force components.

ball and socket

Apoios 3D

Mancal

(5)

single journal bearing

M_x

F_z

M_x F_x
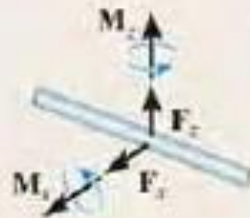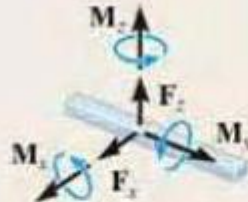
Four unknowns. The reactions are two force and two couple-moment components which act perpendicular to the shaft. Note: The couple moments are generally not applied if the body is supported elsewhere. See the examples.

Apoios 3D

(6)

single journal bearing
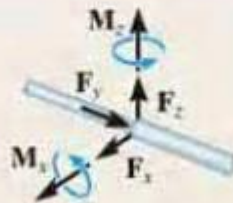with square shaft

M_z
F_z
M_y
M_x
F_x

Five unknowns. The reactions are two force and three couple-moment components. *Note*: The couple moments are generally not applied if the body is supported elsewhere. See the examples.

(7)

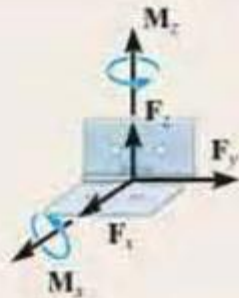single thrust bearing

M_z
F_y
F_z
M_x
F_x

Five unknowns. The reactions are three force and two couple-moment components. *Note*: The couple moments are generally not applied if the body is supported elsewhere. See the examples.

Apoios 3D

(8) single smooth pin

M_z, F_z, F_x, F_y, M_y

Five unknowns. The reactions are three force and two couple-moment components. *Note*: The couple moments are generally not applied if the body is supported elsewhere. See the examples.

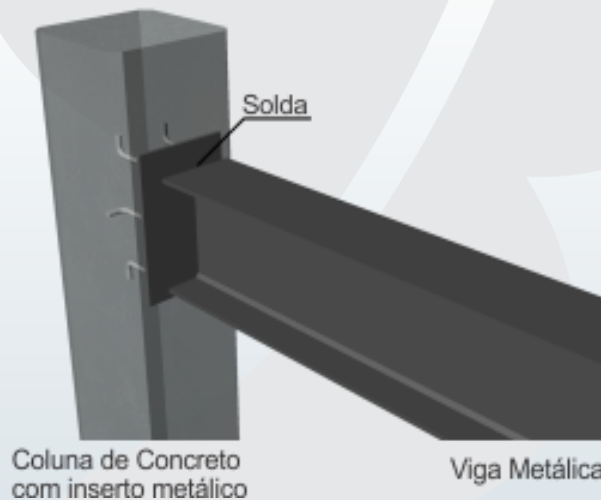(9) single hinge

M_z, F_z, F_y, F_x, M_x

Five unknowns. The reactions are three force and two couple-moment components. *Note*: The couple moments are generally not applied if the body is supported elsewhere. See the examples.

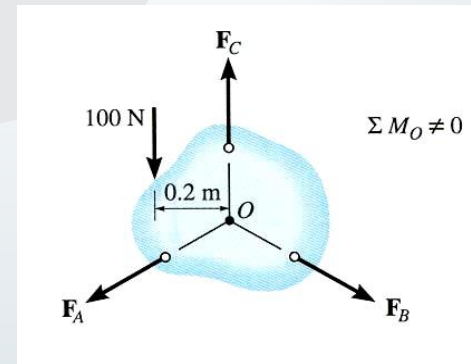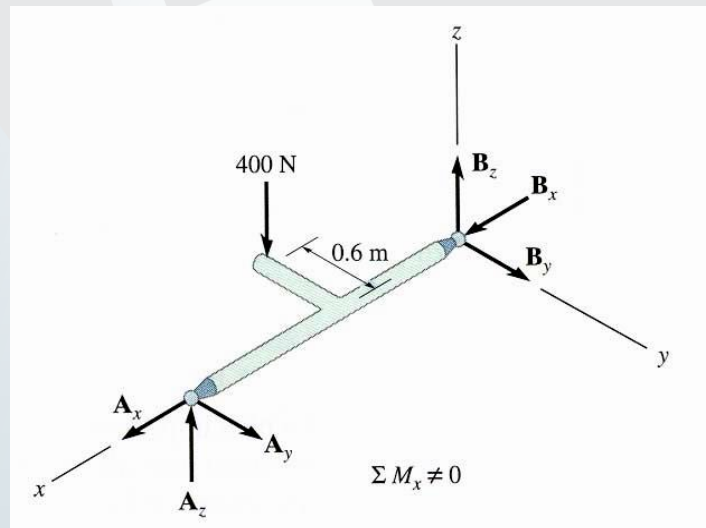# Apoios 3D

(10)

M_z
F_z
F_x
F_y
M_y
M_x
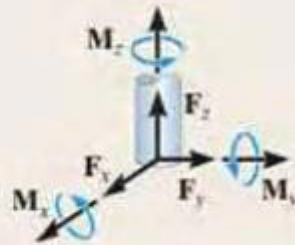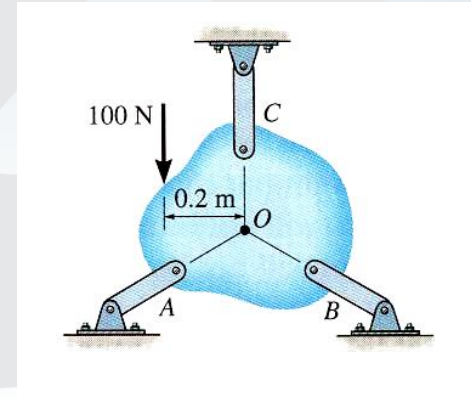
Six unknowns. The reactions are three force and three couple-moment components.

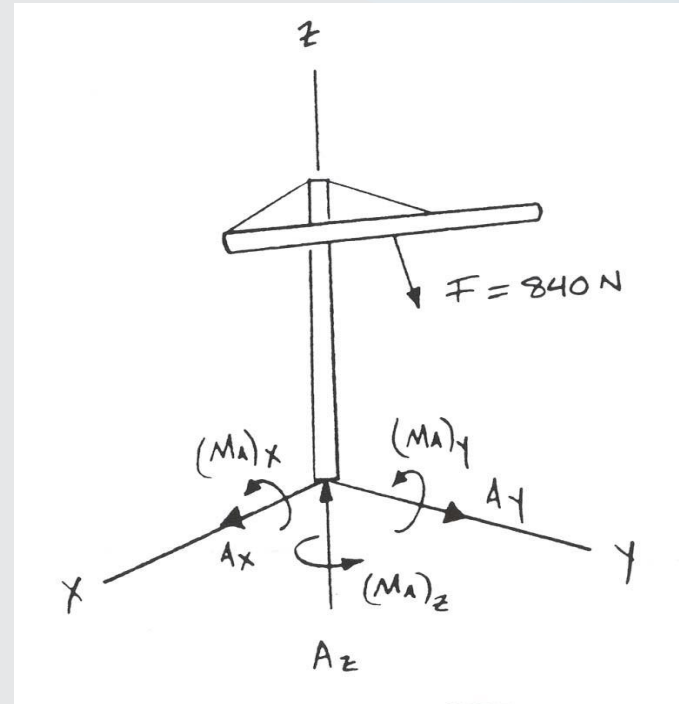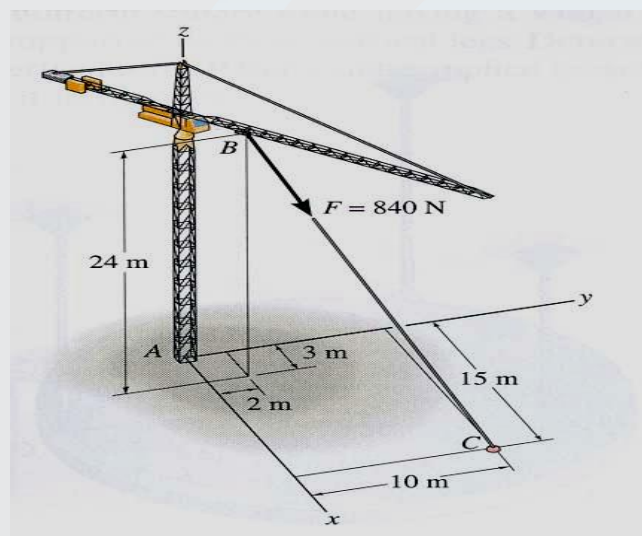fixed support

Solda

Coluna de Concreto
com inserto metálico

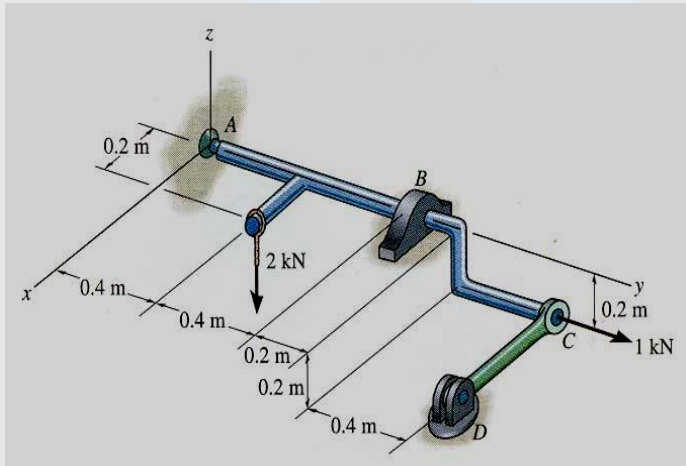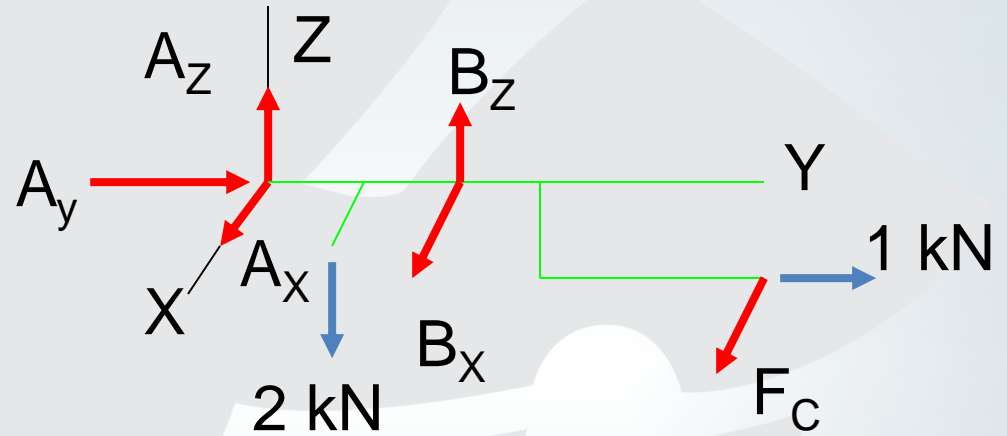Viga Metálica

Restrições redundantes
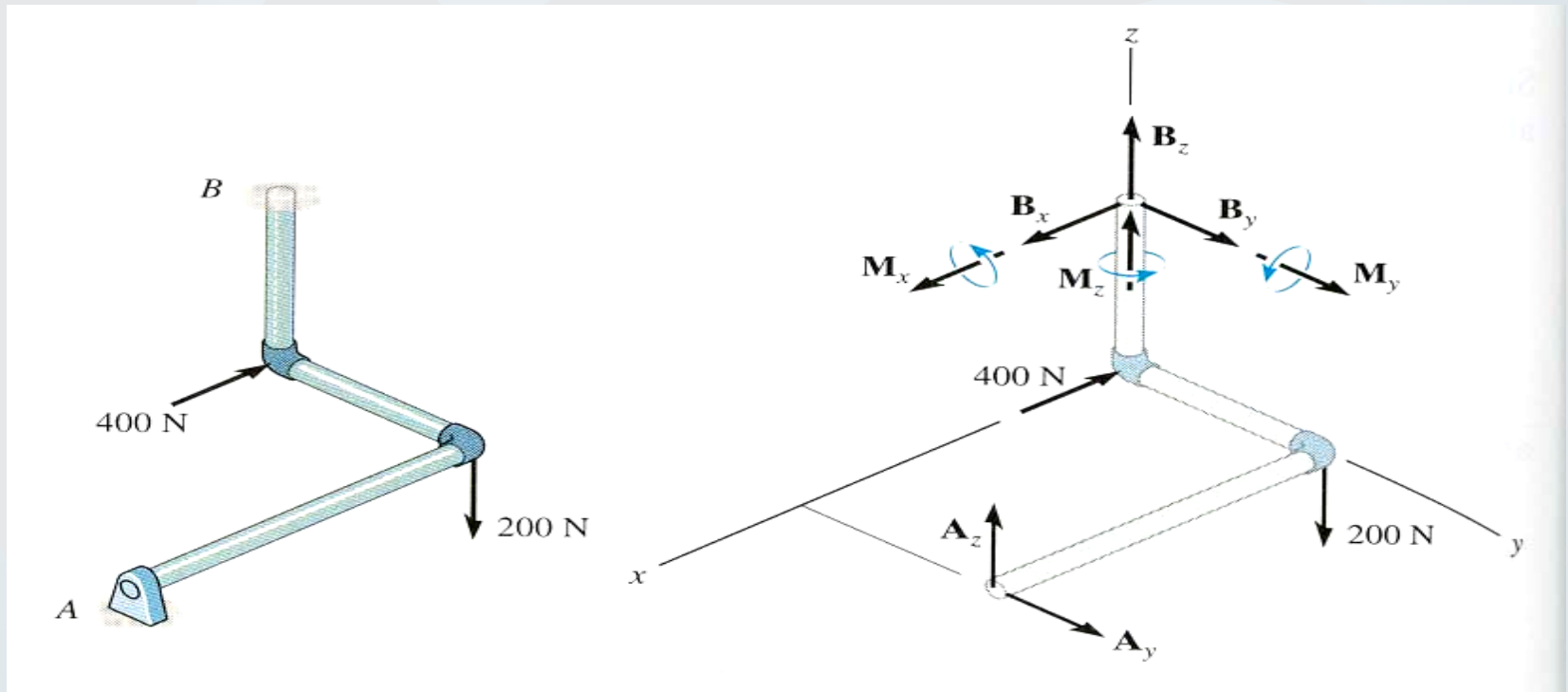
Restrições impróprias
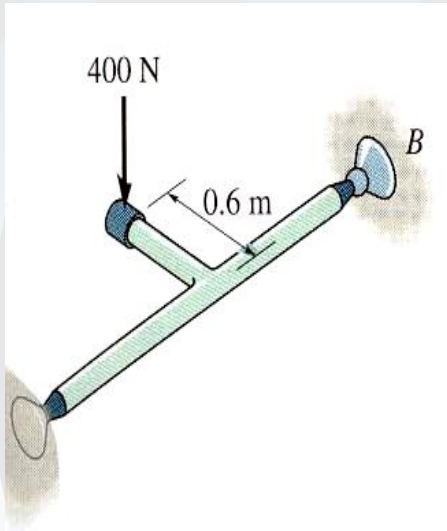
DCL

DCL

A FBD of the rod:

Exercício

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