P6.7-2) Consider the 5-kg disk shown rolling to the right under the influence of a moment (M = 50 N-m). When driven in this manner, the disk typically will experience slip and the friction force $\mathbf{F}_f$ will propel the wheel forward. Using this fact, estimate the angular acceleration α of the disk as well as the acceleration of its mass center $\mathbf{a}_G$. Assume that the coefficient of kinetic friction is μ_k = 0.35 and that the wheel has a radius of 1.0 m.
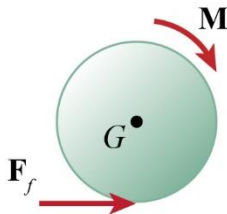

P6.7-2
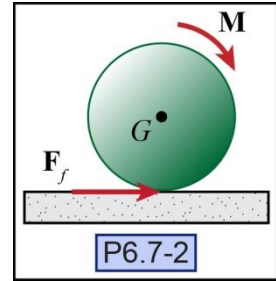
Given:

Find:

Solution:

Draw a free-body diagram of the disk.

Calculate the mass moment of the disk.

What point is our reference?

I = _____

Derive the disk's equation of motion.

Calculate the kinetic friction force.

F_{fk} = _____

Moment equation of motion is ....

α = _____

Force equation of motion is ....

a = _____