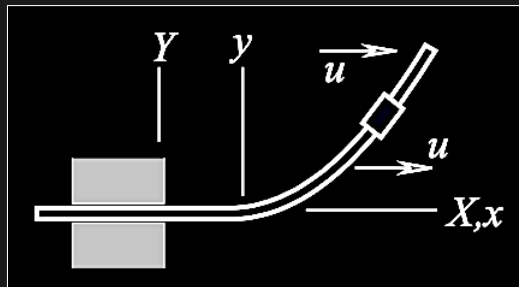


October 9, 2024

MODULE 7 — Assignment

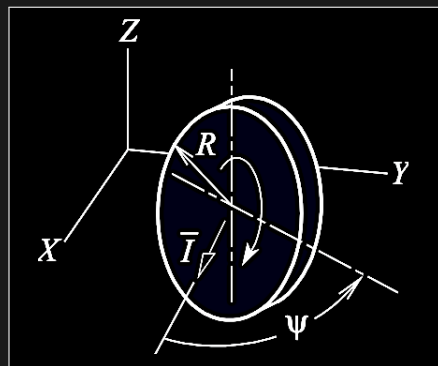
EXERCISE 7.1

The slider descends along a curved guide as the guide translates to the right at the constant speed u . The shape of the guide bar in terms of a body-fixed set of coordinates is $y = \beta x^2$. Generalized coordinates selected for this system are the fixed X and Y coordinates of the collar. Independently derive the velocity and configuration constraint equations relating X and Y . Then show that integration of the velocity constraint yields the configuration constraint.



EXERCISE 7.12

The figure shows a disk that is constrained to roll without slipping on a horizontal XY plane, such that its plane remains vertical. Let the position coordinates X and Y of the geometric center, the heading angle Ψ , and the spin angle ϕ be generalized coordinates. Describe the velocity constraints between these generalized coordinates. From those results, determine the number of degrees of freedom, and whether the system is holonomic.



Submitted by Austin Barrilleaux on October 9, 2024.