MotorKit Parameters

The linearized model of inverted pendulum system is:

$$J_{ip}\ddot{\theta} + \frac{K^2}{R}\dot{\theta} - mgl_c\theta = \frac{KV_s}{R}d$$

Using parameters:

Parameter	Value	Description
m(kg)	4.4×10^{-2}	Mass of pendulum
g(m/s^2)	9.81	Gravitational acceleration
l_c(m)	2.54×10^{-2}	Distance from pivot joint to the center of pendulum rod
J_{rodc}(kg·m^2)	2.16×10^{-5}	Moment of inertia of pendulum about center of rod
J_{rode}(kg·m^2)	8.37×10^{-5}	Moment of inertia of pendulum about end of rod
J_{rotor}(kg·m^2)	1.67×10^{-6}	Moment of inertia of motor rotor
$J_{inertia}$(kg·m^2)	2.33×10^{-5}	Moment of inertia of inertia mode of system
J_{dp}(kg·m^2)	8.54×10^{-5}	Moment of inertia of downward pendulum mode of system
J_{ip}(kg·m^2)	8.54×10^{-5}	Moment of inertia of inverted pendulum mode of system
V_s(V)	10.7	Supply voltage of the motor drive (H-bridge)
d	-	Duty cycle
θ(rad)	-	Angle of pendulum

Table 1: Pendulum system parameters in SI units.

From Lab2 System Identification, you should get your k and τ as parameters of motor, where

$$k = \frac{V_s}{K}$$

$$\tau = \frac{J_{inertia}R}{K^2}$$

For more details, read MotorLabManual you got from Lab2.