README

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This code runs the EnKF on the linearised cart-pole system, and plots the controlled state when the controller is obtained using ARE and using EnKF.

The code is written in Python 3 and there are two files: `constants_ivp.py, ivp.py`. The steps for running the code are as follows:

1. In `constants_ivp.py`, set the desired variables as per the modelling and simulation parameters, see Table 1 and Table 2 respectively for location of these variables in the code.
2. Run `enkf.py`

Table 1: Modelling parameters in `constants_ivp.py`

Modelling parameter	Variable name in code	Line number in code
Mass of ball (m)	`MASS_BALL`	11
Length of rod (l)	`LENGTH_ROD`	12
Gravity (g)	`GRAV`	13
Mass of cart (M)	`MASS_CART`	14
Initial condition of θ ($\theta(0)$)	`theta_init`	50
Initial condition of x ($x(0)$)	`dist_init`	51
Initial condition of ω ($\omega(0)$)	`omega_init`	53
Initial condition of v ($v(0)$)	`vel_init`	52
C	`C`	33
R	`R`	35
P_T	`ST`	36

Table 2: Simulation parameters in `constants_ivp.py`

Modelling parameter	Variable name in code	Line number in code
Number of particles (N)	`N`	5
Total simulation time (T)	`T`	8
Stepsize (Δt)	`STEP`	9