Optimal and adaptive control

* Optimization
* Optimal Control: Linear Quadratic Regulator / Linear Quadratic Gaussian
* Tuning the parameters.

Week\_1: symbolic math.

1. concepts

- different from floating point representation.

- good for analytic solution:

+ parameter uncertainty analysis , differentiation , integration ,..

- matlab / mathmetica /…🡪 matlab / python,..

1. matlab commands

* example:

- algebraic equations.

->> syms x

->> subs(f,x,1)

-polynomials

- >> simplify

* solve algebraic equations
* solve algebraic solutions with undefined parameters

->> pretty

* solve linear system equations
* solve linear system equation with undefined parameters
* solve non-linear equations

Find given the others.

1. dynamic equations.

* Derivatives
* Differential equations , scalar – homogeneous

->> dsolve(diff(x) =-a\*x, x(0), x0)

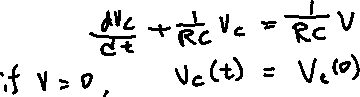
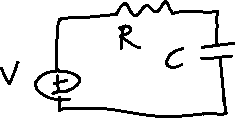
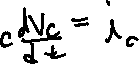
* Differential equations , scalar – inhomogeneous

->>dsolve(diff(x) == -a\*x + sin(t) ,x(0) == x0)

--solution:

->> fplot(f)

* Differential equations.



1. Homogeneous solutions

->> dsolve(diff(v(t))== - 1/(R\*C)\*V, V(0) == V0)