1. Static System Identification
   1. Linear system
   2. Non-linear Static Systems
      1. Non-linear Regression

where

measurements

the known model

the unknown parameters to be estimated

the prediction error ( the measurement noise)

* In the linear case,
  + 1. Non-linear Least square estimation
* The cost function (the sum of squares of the prediction errors)
* The derivative of w.r.t unknown variables (to be estimated)
* The sensitivity function

the number of the measurements

the number of the estimated aprameters

where

the first measurement with

the Nth measurement with

* In Linear case

which is independent of .

%%% Kim’s comment

Since in (a), in general, is dependent of . In concept,

First estimation

Second estimation

y(1)

y(3)

y(2)

x(1) x(2) x(3)

Hence for each , the estimation is evaluated at times with different recursively.

* In linear case

which is independent of



%%%%%%

* Apply Least square as

%%% Kim’s example

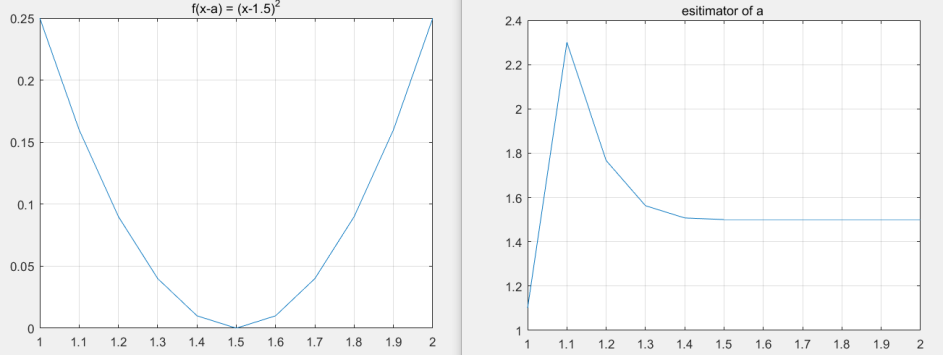
1. Model

(input, measurement) =, unknown = , one unknown.

1. The sensitivity function
2. Pick up an initial estimator as

The sensitivity function

1. Result



* Ex. 5.21 : Nitrification experiment

1. Modelling

Input:

-Nitrogen load

Output:

-The maximal oxygen demand rate

Unknown

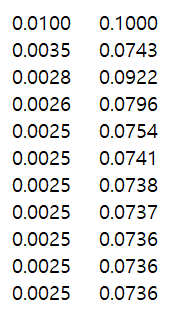
-Death rate of the nitrifying biomass :

-Maximal growth rate of the nitrifying biomass :

1. Formulation

* Define

1. Calculate the sensitivity
2. Results



Estimated (b , umax)

