

Electrical Engineering Department

EEL 774 System Identification & Parameter Estimation.

Major Test, Date 7-5-07,
Time - 2 hours
Max. Marks = 40

Answer all questions. Questions 1 to 6 are each of 6 marks. Question - 7 is of 4 marks.

Q.1 With the help of an example discuss invariant imbedding method to solve parameter estimation problem.

Q.2 Consider a non-linear differential equation of the Vander-pol type

$$\ddot{x} + \alpha(1-x^2)\dot{x} + \beta x = 0$$

Where α and β are unknown parameters to be determined. Design an experiment to identify α and β using quasilinearization method.

Q.3 Consider a scalar non-linear differential equation model of a system. The record of input and output of the system is given. Use Laguerre orthogonal polynomial to identify unknown parameters of the ~~re~~ system recursively.

Q.4 For a linear distributed parameter system, records of input and outputs are given. Discuss a method to identify unknown parameters of the system recursively.

Q.5 Discuss a method for identifying the transfer function $G(s)$ of a time varying system.

Q. 6.

For the linear system shown in Fig.1, $\phi_{xx}(\omega)$ and $\phi_{yy}(\omega)$ are given, find $H(s)$, the transfer function of the system. The system is stable.

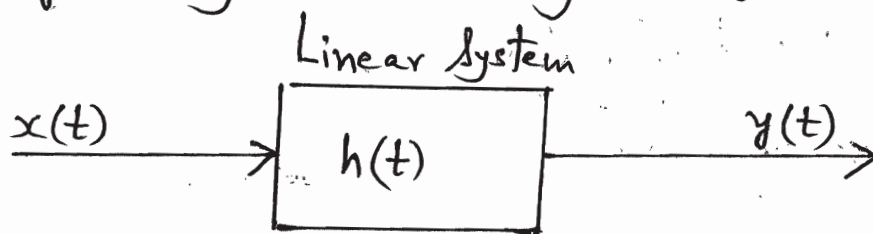


Fig.1

$$\phi_{xx}(\omega) = 1 \quad \text{and} \quad \phi_{yy}(\omega) = \frac{1}{(\omega^4 + 256)}$$

Q.7 Starting from Kalman filter equations, derive the equations for extended Kalman filter.