

1 Briefly explain the Root locus technique

Answer

In control theory and stability root locus analysis is a graphical method for examining how the roots of a system change with variation of a certain system parameter commonly a gain with a feedback system

This is a technique used as a stability criteria in the field of classical control theory which can determine stability of the system. The root of the locus plots the poles of the closed loop transfer function in the complex s -plane as a function of a gain parameter.

2. Describe the use of Routh Hurwitz to find the stability of a closed loop system. when:

- (a) Entire row is zero on the Routh table
- (b) to determine the poles on the $j\omega$ axis

For entire row is zero on the Routh table

In order to find the stability in the case, we will first find an auxiliary equation, the auxiliary equation can be formed by using the elements of the row, just above the row of zeros in the Routh array and after finding the auxiliary equation we will differentiate it to obtain elements of the zero row. If there is no sign change in the new Routh array formed by using auxiliary equation, then we conclude the system given is limited stable. While in all other cases we would say the given system is unstable.

(b) To determine the poles on the $j\omega$ axis when the table is completed the number of sign changes in the first column will be number of non-negative poles. But sometimes, the coefficient of the row in a whole row become zero & thus further calculation of the elements of the array is not possible (i.e. table cannot be completed). This happens when there exist conjugate poles on the imaginary axis. In this case, we must use the auxiliary polynomial, which is built from the coefficients of the last non-zero, and then differentiate it.