

ABSTRACT

Linear Quadratic Regulator (LQR) control problems have been widely investigated in the literature. The performance measure is a quadratic function composed of state vector and control input. If the linear time-invariant system is controllable, the LQR control law will be obtained via solving the algebraic Riccati equation. The LQR tuning algorithm in microcontroller MC68HC11 is applied to the speed control of servo motor. The performance measure to be minimized contains output error signal and differential control energy. The LQR controller receives error signal only and it doesn't need to feedback full states. The Q matrix can be determined from the roots of the characteristics equation. Once the poles for the closed-loop system are assigned, the existence criteria of the LQR controller are derived. In the motor control systems, error detector signal are used to provide feedback information on the motor. This error comparator is used in the control loop and to improve the reliability by detecting fault conditions that may damage the motor.

ABSTRAK

Masalah pengendalian kawalan menggunakan cara Linear Quadratic Regulator (LQR) telah dikaji dengan meluas. Oleh sebab itu, perlu adanya pengendalian optimal. Pelaksanaan ukuran ini merupakan fungsi quadratik dengan gabungan state vector dan control input. Jika system linear time-invariant boleh dikontrol, prinsip kontrol LQR akan diperolehi melalui penyelesaian persamaan Riccati algebra. Aplikasi kontrol halaju didalam terhadap motor servo adalah melalui pelarasan LQR algoritme didalam mikrokontroller,MC68HC11. Operasi ukuran yang diminimumkan , megandunggi perbezaan tenaga kontrol dan ralat signal. Kontroller LQR akan menerima ralat signal sahaja dan tidak perlu mendapatkan maklum balas pada full states. Matrix Q boleh diperolehi melalui punca bagi sifat persamaan tersebut. Apabila kutub bagi sistem rangkaian tertutup ditentukan, kriteria kewujudan pada kontroller LQR akan diperolehi. Didalam sistem kontrol motor, ralat pengesan digunakan untuk memberi maklum balas terhadap motor. Perbezaan ralat ini digunakan di dalam rangkaian kontrol dan untuk meningkatkan konsistensi dengan mengesan kesalahan pada sistem yang mungkin merosakkan motor.