Abstract

The paper deals with the design of robust controller for uncertain SISO systems using Quantitative Feedback Theory (QFT) and optimization of controller being done with the help of Genetic Algorithm (GA). Quantitative Feedback Theory (QFT) technique is a robust control design based on frequency domain methodology. It is useful for practical design of feedback system in ensuring plant's stability by reducing the sensitivity to parameter variation and
attenuates the effect of disturbances. Parameter variation or physical changes to the plant is taken into account in the QFT controller's design. Quantitative Feedback Theory (QFT) can provide robust control for the plant with large uncertainties. The manual design with the help of QFT toolbox in Matlab is complicated and even unsolvable. The existing automatic design methods are limited in optimization. Based on the genetic algorithm (GA), a more effective automatic design methodology of QFT robust controller is proposed. Some new optimization indexes like IAE, ISE, ITAE and MSE are adopted, so the design method is more mature. To obtain good performance of the controller in a relatively short time, the manual design and the automatic design are combined. Compared with the results from the manual design method, the performance of the QFT controller based on genetic algorithms is better and the efficiency of searching scheme is the best. An illustrative example which compares manual loop shaping with automatic loop shaping is given.

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**Index Terms**

Computer Science  
Algorithm

**Keywords**
Robust Controller  
Quantitative Feedback Theory (qft)  
Genetic Algorithm (ga)  
Uncertainties
Stability
Manual Loop Shaping
Automatic Loop Shaping
Optimization Index
Matlab
Mean Of The Squared Error (mse)
Integral Of Time Multiplied By Absolute Error (itae)
Integral Of Absolute Magnitude Of The Error (iae)
Integral Of The Squared Error (ise)