ABSTRACT

This thesis proposes the application of genetic algorithms for the synthesis of filters which modulate signals of variable structure sliding mode controllers. The modulation of the control signal reduces the amplitude of the output signal and thus can reduce power consumption and chattering. These filters are also applied to systems with parametric uncertainties and unmeasured state variables. In these systems, the uncertainties can impair the accurate estimation of the state by means of observers. For the synthesis of these filters, it is necessary to obtain the envelope which is the maximum norm of each impulse response admissible for the system. After this step, a filter is synthesized to be an upper bound for the envelope. In this study, three methods of search of the envelope by genetic algorithms were developed. One of these methods has been giving the best results and needs the least computational time.

Keywords: Filter synthesis. Variable structure control. State observer. Genetic algorithms. Impulse response. Envelope. Modulation signal.