Abstract

Mostafa Ahmed Abdel Galil

Controller design and adaptation based on Dynamic Safety Margin

Most of the real processes have state and control constraints. Design a control system, which achieve the required performance in addition to avoiding the constraints violation, is an essential demand. The dynamic safety margin (DSM) is an index used to indicate the system constraints achievements and used also as a measure for the violation of constraints. The design of a controller based on DSM is useful to maintain a predefined margin of safety during the transient phase of the system when disturbances faults are present. In this paper, the conditions to controller parameters in order to satisfy DSM constraints are discussed. Moreover, Using the DSM as a performance index to adapt controller parameters, in particular PID controller is proposed. The difference between the proposed design techniques is illustrated using a simulation example.