

System optimization algorithm for 3DOF quarter car active suspension

ABSTRACT

This paper handles the synergy between the design and control optimization problem for an active car suspension system consisting both active and passive components. The dynamics of the suspension system are modeled utilizing a three degree of freedom (3DOF), linear with time invariant quarter car model with capability to capture the impact of the passive stiffness on suspension deflection depending up on the spectral density of road disturbances. Direct transcription, a strategy which guarantees system optimality, is presented and utilized to find the optimal design of the suspension system. The active system dynamics were analyzed with modified level of control force to examine how dynamic system should be designed accordingly when the active control force is introduced.

Keyword: Active suspension system; System optimization; Quarter car model; Direct transcription; Optimal design