Abstract

In this paper the quasilinearization technique along with the Chebyshev polynomials of the first type are used to solve the nonlinear-quadratic optimal control problem with terminal state constraints. The quasilinearization is used to convert the nonlinear quadratic optimal control problem into sequence of linear quadratic optimal control problems. Then by approximating the state and control variables using Chebyshev polynomials, the optimal control problem can be approximated by a sequence of quadratic programming problems. The paper presents a closed form solution that relates the parameters of each of the quadratic programming problems to the original problem parameters. To illustrate the numerical behavior of the proposed method, the solution of the Van der Pol oscillator problem with and without terminal state constraints is presented.


Index Terms

Computer Science

Applied Mathematics
Keywords

Nonlinear optimal control problem  Chebyshev polynomials  Quasilinearization
Iterative method