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Title: Study of Gliding Trajectory Optimization Algorithm Based on Gauss Pseudospectral Method

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关键词: 高斯伪谱法; 滑翔制导炮弹; 弹道; 优化; 算法

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摘要: 为了提高滑翔增程制导炮弹方案弹道的优化效率,提出了一种基于高斯伪谱法的方案弹道优化方法。以滑翔时间最短为性能指标,滑翔舵偏角为设计变量,建立了纵向平面内弹道优化模型,采用高斯伪谱法对状态量和控制量进行了离散,将最优控制问题转换为非线性规划问题,并利用序列二次规划法对其进行了求解,仿真结果表明该方法收敛域大,对初值不敏感,优化精度高,可为远程制导炮弹的方案弹道优化设计提供一定的参考。

Abstract: In order to enhance the efficiency of trajectory optimization algorithm for gliding guided projectiles, a Gauss pseudospectral method was presented. The flight time and angle of attack deflection were chosen as the performance function and control variable respectively, the end trajectory slope angle and velocity were also restrained for guarantee of attack effect, the trajectory optimization model was established and transcribed into a discrete nonlinear programming problem(NLP)by using the Gauss pseudospectral method, and solved by sequence quadratic programming algorithms. The simulation results show that the Gauss pseudospectral has a large convergence domain, and is less sensitive to the initial guess and can obtain high precise solutions. These results can provide a useful tool for nominal trajectory design of guided projectiles.

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