Sample Book Title [1]

Sample book subtitle [2]

FIRST-NAME LAST-NAME[3]

October 31, 2018

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[1]This is a footnote.
[2]This is yet another footnote.
[3]www.example.com

Contents

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Introduction

This document details the operation of LODESTAR, a program for launch vehicle trajectory optimisation. LODESTAR is based on the GPOPS-2 optimal control package, which utilises the pseudospectral method of optimal control. Specific details of the operation of GPOPS-2 can be found in the GPOPS-2 User Guide[CITEXX]. LODESTAR configures GPOPS-2 to calculate an optimal trajectory solution, and calculates a simulation of a launch system in a manner which facilitates an accurate and robust trajectory optimisation.

-what is LODESTAR actually doing, ie doing 6dof calculations, doing forward sims

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Getting Started

-assumed prerequisite knowledge, optimisation, and lead into PS method

2.1 Prerequisite Knowledge

This document assumes some familiarity with optimal control theory, including the concept of a constrained optimal control problem. Intimate knowledge of the optimal control process is not required to configure LODESTAR to a basic level, however it is useful to have a general understanding of the processes employed by GPOPS-2, including the purpose of transcription methods, and the operation of the pseudospectral method in particular.

2.2 The Pseudospectral Method

The pseudospectral method utilised by GPOPS-2 is a robust and accurate method of transcription for complex optimal control problems. Specific details of the pseudospectral method can be found in [CITEXX my thesis?].

-detail states, controls and constraints and why they are important. -dont go into too much detail

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Inputs

-aero -engine -details of config files

    -provide some details of how these are interpolated, and the best way to organise the data for inputs. link to output plots and how to determine if the input data format is negatively affecting the optimal solution.

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Outputs

-improve and standardise outputs, per Michaels email -detail verification

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Configuration of GPOPS-2

-the backend stuff of LODESTAR - dont go into too much detail here, maybe just list states and controls and provide some info on guesses

5.1   Structure of LODESTAR

-detail each individual subroutine (maybe a modified version of flowchart)

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Example Trajectory

-detail a simple example, using the existing aero and launching from australia

This section contains an example of a trajectory optimisation using LODESTAR, to illustrate the capabilities of LODESTAR and to provide insight into what is required of a user.

Firstly, the file config.m is set up to contain the design parameters of the vehicle such as the mass, reference area and design constraints of the vehicle.