

**WORKING TITLE: UTILIZING INVARIANT MANIFOLDS OF
CISLUNAR PERIODIC ORBITS FOR EFFICIENT DEEP
SPACE TANSFERS**

by

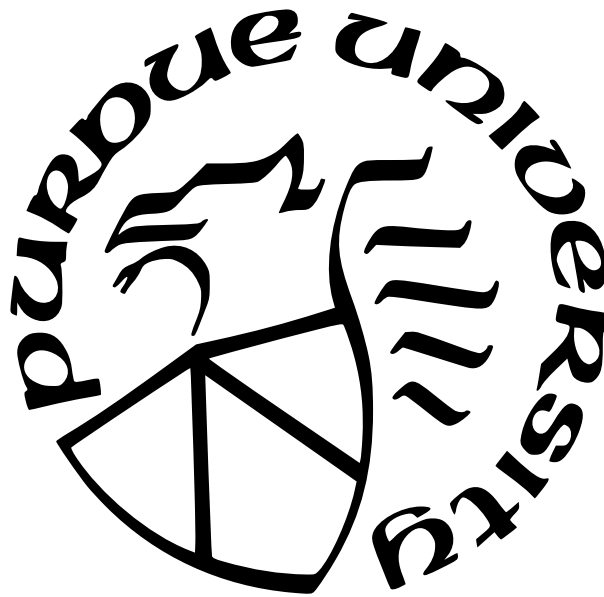
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A Thesis

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School of Aeronautics and Astronautics

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ADD DEDICATION

ACKNOWLEDGMENTS

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LIST OF SYMBOLS

ABBREVIATIONS

ABSTRACT

ADD ABSTRACT

1. INTRODUCTION

Experimenting with the available typographic conventions defined in the Purdue file: `pa-typographic-conventions.sty`: these include *Emph First Title* `Keys` `Literal` `Menu` `Open menu` `Preferences` `Shell.sh`. Now let's try out a footnote¹, one of the fancy TODO notes , and more scary TODO , as well as a a todo error as well as a citation **Howell:1984_HaloOrbits**. Note the TODO comments currently only show up in `quick` or `debug` modes (for now).

1.1 Subcaption / Cleveref Testing

Here is a very important and informative figure for Orion. You can see in Figure 1.1 that there is both Figure 1.1(a) and Figure 1.1(b)! There is also important information in Table 1.1. If you're confused, then Equation (1.1) should clarify things. Some other ways to put it: Equations (1.1) and (1.2) and Equations (1.1) to (1.3).

1.1.1 Important Math

$$e^{i\pi} + 1 = 0 \tag{1.1}$$

$$a^2 + b^2 = c^2 \tag{1.2}$$

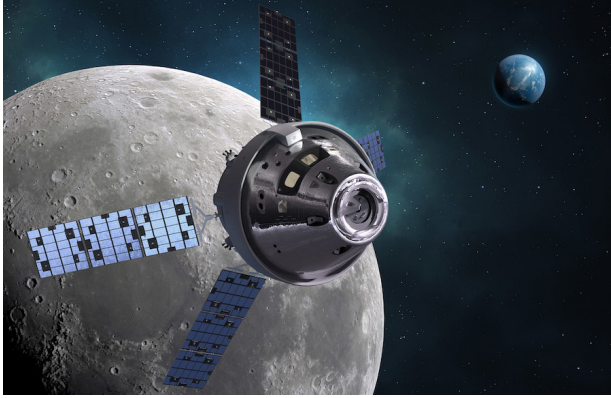
$$\frac{df}{dt} = \lim_{h \rightarrow 0} \frac{f(t+h) - f(t)}{h} \tag{1.3}$$

1.1.2 Numbers/Units

Some of the number formats available: -10^{10} . 2×4 . 10 to 11. 12.3° .

Experimenting with the siunits package: 8 kg m s^{-2} . 9N. $2.3 \times 10^{27} \text{ kg}$. $1.345 \frac{\text{C}}{\text{mol}}$.

¹↑I'm a footnote!



(a) Orion 1



(b) Orion 2

Figure 1.1. Two images of Orion: (a) and (b).

Table 1.1. Sample Table

Sample	Table
x	2

A subsubsection

A subsubsection for testing out the table of contents

A paragraph

What happens for a paragraph in the table of contents?

1.1.3 Custom variables

Variables can be defined as functions in `t0-template` \gg `te4-custom-variables.tex`

The rotating x axis is clearly the best of all axes. But even better is the \boldsymbol{x} vector and the \hat{x} direction! See the appendix in Debug mode for details

1.1.4 Custom colors

There are a variety of available colors from Purdue's branding² like: `Boilermaker Gold`, `Rush`. This example document also include the Tableau colors³. For example, `tab-blue` and `tab-red`.

1.1.5 Acronyms

Acronyms handled through `glossaries`, and defined in `t0-template` \gg `te6-acronyms.tex`. For example, the first time we will refer to the Circular Restricted Three Body Problem (CR3BP), and in the future only say CR3BP.

²↑see <https://marcom.purdue.edu/our-brand/visual-identity/>

³↑used in matplotlib - https://matplotlib.org/3.4.1/gallery/color/named_colors.html

2. DYNAMICAL MODELS

2.1 The Two-Body Model

2.2 The Circular Restricted Three-Body Problem

2.3 The 2BP-CR3BP Patched Model

2.4 Coordinate Frames and Transformations

3. CR3BP DYNAMICAL STRUCTURES

3.1 Differential Corrections

3.2 Periodic Orbits

3.3 Invariant Manifolds

4. TRAJECTORY CONSTRUCTION

4.1 2BP Lambert Arcs

4.2 The Moon-to-Moon Analytical Transfer Method