Marian Mureşan

Applications of Calculus of Variations and Optimal Control to Space Rendezvous

Έν οῖδα ότι δέν οῖδα
(The only thing I know is that I don't know anything)
Socrates[1]

We have all heard the old adage, takeoffs are optional, landings are mandatory.
We rephrase it as takeoffs are optional, meetings are mandatory.

[1] Socrates of Athens (*Σωκρατης ο Αθηναιος*) ∼470–∼399 (BC).

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Preface

This book is under construction. Be patient, please!

Throughout this book we use the following notations: $\mathbb{N} = \{0, 1, 2, \dots\}$ for the set of natural numbers, $\mathbb{N}^* = \{1, 2, \dots\}$ for the set of nonzero natural numbers, $\mathbb{Z} = \{\dots, -2, -1, 0, 1, 2, \dots\}$ for the set of integer numbers, $\mathbb{Q} = \{p/q \mid p, q \in \mathbb{Z},\ q \neq 0\}$ for the set of rational numbers, $\mathbb{R}$ for set of real numbers, $\mathbb{R}^m$ for the real m-dimensional Euclidean[2] space, $m \in \mathbb{N}$. We note that $\mathbb{R}^0 = \{0\}$ and $\mathbb{R}^1 = \mathbb{R}$. $\mathbb{R}_+ = [0, +\infty[$ is the set of nonnegative real numbers, $\overline{\mathbb{R}} = [-\infty, +\infty]$ is the set of extended real numbers, and $\overline{\mathbb{R}}_+ = [0, +\infty]$ is the set of extended nonnegative real numbers.

All the figures and calculations are done by *Mathematica*®.

Most of the stuff of the present booklet are taken from [126].

Cluj-Napoca

Marian Mureşan
Babeş-Bolyai University
Faculty of Mathematics and Computer Science

[2] Euclid of Alexandria, ∼325 – ∼265 (BC)