

Preface

This book originates from a long-lasting research effort aimed at tackling difficult non-standard packing issues arising in space engineering and logistics. In this framework the necessity of exploiting the spacecraft load capacity, as much as possible, represents a paramount challenge. This holds especially in the perspective of the manned and unmanned interplanetary missions that are going to be carried out in the near future. The experience gained in this quite peculiar context is able to suggest insights on possible extensions to several engineering and industrial sectors. They range from transportation to manufacturing, including sophisticated technological areas, such as Electronic Design Automation (EDA) and Very Large Scale Integration (VLSI).

This work is not intended to provide the readers, independently from their technical background, with a comprehensive survey on packing applications and the relevant cutting-edge methodologies. Quite a specific point of view is presented instead, reflecting the author's experience and acquired know-how. The overall *Global Optimization* (GO) approach, based on *Mixed Integer Linear/Nonlinear Programming* (MIP, MILP/MINLP) and heuristic processes, as carried out in the above mentioned context, is argued. Both the modelling, algorithmic and experimental aspects are considered, always keeping in mind possible links and synergic interactions with alternative, as well as complimentary, perspectives.

This study encloses both the author's previous consolidated work and a significant part of novel achievements, in terms of experimental outcomes, as well as model and algorithm enhancements. Drawing up this work, a systematic effort has been devoted to the harmonization and integration of both previous and current innovative material. A number of mathematical concepts are understood, as well as more specific notions (usually indicated in italics) that concern the *optimization* and *mathematical programming* context. For further in-depth clarification the reader may refer to the websites: <http://mathworld.wolfram.com> and <http://glossary.computing.society.informs.org>.

This work most certainly focuses more on practical aspects than on theoretical rigour, referring the reader to the topical specialist literature, when necessary. It is, however, addressed both to researchers and practitioners involved in optimized packing, with strong motivation by challenging and non-conventional real-world problems.

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