

Cable-Driven Parallel Robots

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Preface

Origins of cable-driven parallel robots lie in the late 1980s when first concepts of cranes, parallel kinematic manipulators, and cable-driven robotic devices were combined in the United States and in Japan.

Researchers all over the world started to work on these special robotic systems, most of them having a strong background in parallel kinematics: in contrast to conventional parallel and serial manipulators, cable-driven parallel robots promise a couple of unique advantages over other kinematic concepts. Cable robots allow for significant improvements in the size of the workspace, the maximum payload, and the dynamic capacities due to their superior efficiency in transmitting forces through cables. The research on cable robots led to a number of challenging scientific questions in the field of kinematics, statics, dynamics, control, and design. Due to the lack of a dedicated forum on cable robots, active researchers published their results, widely dispersed, in a broad range of robotic conferences and journals. Meanwhile, the number of contributions in this field was rapidly growing.

Recently, projects have started transferring the cable robot technology into practical application, e.g., in the fields of industrial large-scale material handling, intralogistics, and physiotherapy.

For the very first time, leading experts from three continents gather during the First International Conference on Cable-Driven Parallel Robots in Stuttgart, Germany. The conference allows the cable robot community to exchange ideas and to create new connections between active researchers around the world. The conference was organized under the patronage of International Federation for the Promotion of Mechanism and Machine Science (IFToMM).

Within this book, some of the most renowned experts present the state of the art, including both summarizing contributions as well as latest research results in key areas such as workspace, design, and control. The papers in this book cover classical topics such as motion planning, kinematics, dynamics, control, as well as design and their implications on cable robots. At the same time, practical issues such as components for cable robots, calibration, and prototyping are presented,

summarizing experiences from the increasing number of applications and prototypes.

We are most grateful for the authors for their outstanding contributions, for the reviewers for their critical but valuable feedback, and for the great support of the scientific committee that turned this conference into success. We would also like to extend our thanks to the staff at Springer for their support and patience during the preparation of the manuscripts.

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