

Preface

Dynamic models of robots play an important role in their design and control. Most publications that are meant to teach computation of dynamic models of (rigid and/or flexible) parallel robots are general works defining general equations that can be applied to constrained or closed-loop systems. However, they usually suffer from lack of the following information:

- they usually miss the fact that the Jacobian matrices used in a dynamic model to set up dynamic constraints are not so simple to compute, and no straightforward way to compute them is provided.
- most of these works do not propose efficient ways to reduce computational complexity of dynamic models. However, this reduction of complexity is crucial for obtaining models able to predict robot behavior for simulation and control, and to speed up a robot's optimal design process.
- they totally miss the facts that (i) in the presence of certain types of singularities, the dynamic models may degenerate and that (ii) this degeneracy can be avoided thanks to optimal trajectory planning.
- they do not provide experimental results to show that, even if they are complex, dynamics models of parallel robots can be very accurate.

The present book, based on material published by the two authors over the last fifteen years, aims at filling all these gaps and thus providing some tools for engineers, master and Ph.D. students dealing with the dynamics of parallel robots.

Some results given in the book were reached in collaboration with Vigen Arakelian, Nicolas Bouton, Frédéric Boyer, Etienne Dombre, Maxime Gautier, Coralie Germain, Sylvain Guégan, Ouarda Ibrahim, Philip Long, Philippe Martinet and Georges Pagis. The authors acknowledge each of them for their contributions.

The interested reader will also find within the book some links or references to free software or portions of Mathematica codes in which the presented algorithms for computing the kinematics and dynamics of some studied robots are already encoded.

The authors will be also genuinely grateful to the readers for any critical feedback on the material presented in the book and for any suggestion for its improvement.

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Sébastien Briot
Wisama Khalil

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Briot, S.; Khalil, W.

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