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PREFACE

Optimization and control are important research directions in robotics, where different kind of robots are faced with the problem of executing multiple tasks simultaneously. The optimum design is a complex problem because the governing equations of motion of the end-effector in the workspace are nonlinear with complex and difficult to obtain solutions. Numerous performance indices have been proposed in literature, to quantify and measure the performance of the robot in its workspace, such as dexterity index, manipulability index, condition number, minimum singular value, etc.

Articles 2-5 study such optimization issues in robotics, i.e. a soft tentacle robot for minimally invasive surgery, a Stewart platform with flexible joints and a packing manipulation robot. In addition, it has been observed for a long time that motion of many biological systems is the result of the optimization process, where the objective function can control not only the motion or deformation, but also the dynamics, effort, jerk, or execution time. The need for such optimization process is increasing dramatically since new fast walking, climbing and running robots on/under the ground, in air or space are currently under development and need a multi-locomotion stable and predictive control.

This issue is completed with numerical and experimental investigations of the behaviour of a frame equipped with NITi wires, and the relationship between the equilibrium and motion equations for a thin elastic beam. Vibration system tests are performed in the first article in order to investigate the behavior of the frame equipped or not with NiTi wires and the effect on the SMA wires on the amplitudes reduction, the transformation behavior for wires and avoiding of the resonance states. The last article studies the conditions for which the motion equations of a thin elastic beam are equivalent to its equilibrium equations. If these conditions are fulfilled the exact solutions of the motion equations of the thin elastic beam can be determined from the exact solutions of the equilibrium equations.

The guest editor, Ligai MUNTEANU, would like to thank all authors and co-authors for their contributions to this special issue. In addition, we would like to thank the reviewers for their valuable comments, which have led to increased quality of this issue.

Editors