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Configuration Control and Dynamic Analysis of Redundant Link-Type Manipulators

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Configuration control and dynamical behavior are examined by numerical simulations focusing on redundant link-type manipulators which are boarded on the spacecraft and make an operation to move their end effecter toward the target position avoiding obstacles in the work area. Simulations are limited for two-dimensional model and are composed of four stages; 1) Determination of end effecter orbit, 2) Determination of link configuration, 3) Dynamical behavior for rigid link system and 4) Influence of link elasticity to the motion. In the determination of the orbit and link configuration, artificial potentials are given that are inversely proportional to the distance with the obstacles. The elastic deformation is modeled by finite element approach. As results of simulations, end effecter orbits and link configurations were obtained which can avoid the obstacles, and influence of the link elasticity were clarified for the avoidance of obstacles and the final positioning.

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