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Passive Non-Prehensile Manipulation on Helix Path Based on Mechanical Intelligence

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Abstract : Object manipulation techniques in robotics can be categorized in two major groups including manipulation with grasp and manipulation without grasp. The original aim of this paper is to develop an object manipulation method where in addition to being grasp-less, the manipulation task is done in a passive approach. In this method, linear and angular positions of the object are changed and its manipulation path is controlled. The manipulation path is a helix track with constant radius and incline. The method presented in this paper proposes a system which has not the actuator and the active controller. So this system requires a passive mechanical intelligence to convey the object from the status of the source along the specified path to the goal state. This intelligent is created based on utilizing the geometry of the system components. A general set up for the components of the system is considered to satisfy the required conditions. Then after kinematical analysis, detailed dimensions and geometry of the mechanism is obtained. The kinematical results are verified by simulation in ADAMS.

Keywords : mechanical intelligence, object manipulation, passive mechanism, passive non-prehensile manipulation
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