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A Method for Modeling Flexible Manipulators: Transfer Matrix Method with Finite Segments

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Abstract : This paper presents a computationally efficient method for the modeling of robot manipulators with flexible links and joints. This approach combines the Discrete Time Transfer Matrix Method with the Finite Segment Method, in which the flexible links are discretized by a number of rigid segments connected by torsion springs; and the flexibility of joints are modeled by torsion springs. The proposed method avoids the global dynamics and has the advantage of modeling non-uniform manipulators. Experiments and simulations of a single-link flexible manipulator are conducted for verifying the proposed methodologies. The simulations of a three-link robot arm with links and joints flexibility are also performed.

Keywords : flexible manipulator, transfer matrix method, linearization, finite segment method
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