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Contribution to Inverse Kinematic Modeling of a Planar Continuum Robot Using a Particle Swarm Optimization

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Abstract: According to the literature, research on modeling continuum robots isfocused on ways to develop the kinematic models, because of the lack of analyticalmodels for these robots and the complexity of the problem which reside in thecoupling of operational variables and infinite of possible solutions for a desiredconfiguration. This paper presents a numerical approach for solving the inversekinematic model of a planar continuum robot (PCR), assuming that each sectionof the manipulator is curved as a circular arc, with an inextensible central axis ofthe structure. At first, this paper presents an inverse kinematic model solution forone bending section, whereas the extreme points, of each section, used in calculatingthe inverse kinematic model for multi-sections is calculated numerically usinga particle swarm optimization (PSO) technique. Finally, Simulation examples ofthis method are carried to validate the proposed approach.

Keywords : Planar continuum robot, modeling, Inverse kinematic model, optimization, Particle Swarm Optimization