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# New Approach to Modeling a planar flexible continuum robot simulating elephant trunk

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**Abstract:** Research on the modeling of continuum robots is focused on ways to construct the geometric models, while maintaining maximum specificities and mechanical properties of the robot. This paper presents a new approach of geometric modeling of continuum planar multi- sections robots, assuming that each section is curved in a circular arc, while having inextensible central axis of the structure. The direct geometric model is calculated analytically, whereas the extreme points (used in calculating the inverse geometric model) of each section are calculated numerically using a particle swarm optimization (PSO) method. One advantage of this method is to simplify the mathematical calculations and transform the complex problem into a simple numerical function; which allows the knowledge of the form of the central axis of the robot. Simulation examples using this method are carried to validate the proposed approach.

**Keywords :** Flexible Continuum Robot, central axis, PSO, Khalil Klifinger method