

Compliant Link Shape Synthesis Using Energy Minimization Method

Abstract

This paper presents a synthesis procedure for compliant links with tip concentrated loads. The solution is based on solving the inverse static problem involving the compliant link by modeling the large beam deflection. The beam deflection is approximated by a power series function and the model is used to synthesize the links shape that retains the minimum energy associated with a given tip position and producing the tip loads as well. The solution procedure adopted presents a direct approach to the simultaneous solution of a system of equations rather than using shooting methods to solve the nonlinear differential equation associated with large deflection modeling. It eliminates the need for the synthesis/analysis iterative solution methods available in current literature. Several examples were presented to prove the method effectiveness and robustness.