

# Geometric Uncertainty in Truss Systems: An Interval Approach

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## Abstract

Engineering systems are usually designed with a pre-described geometry in order to meet the intended function. However, due to fabrication errors and/or thermal changes, the dimensions of system components will deviate from their nominal values creating a miss fitting problem during the manufacturing/construction process. In the case of truss systems, bars are forced into their pre-described positions between two joints by applying initial extension or compression. Under such a condition the truss bar geometric uncertainty is converted to an axial force that is induced in the bar even in the absence of external loads. In the present work, the system components deviations from the nominal dimensions are introduced as intervals, and the geometric uncertainty is converted into an equivalent load uncertainty. Using Interval Finite Element Methods the exact enclosure on the final system geometry is obtained. Results are illustrated in example problems.