

WORST CASE BOUNDS IN FINITE ELEMENT COMPUTATIONS

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Many of the parameters entering in practical finite element calculations are inherently uncertain; the traditional finite element packages however do not allow the user to assess the effect of these uncertainties. The only option with these packages are Monte Carlo calculations, which repeat the same computations over and over for different scenarios compatible with the uncertainty. If the uncertainty is specified in non-probabilistic terms by uncertainty intervals, Monte Carlo studies systematically underestimate the worst case effects.

This talk discusses the options available for getting true worst case results, using techniques from sensitivity analysis, interval analysis and optimization. Besides presenting the theoretical principles, some illustrations (from joint work with Andrzej Pownuk) are given for truss structures modeled in ANSYS.