Aur©lien Hot, Thomas Weisser and Scott Cogan, 2017, An info-gap application to robust design of a prestressed space structure under epistemic uncertainties, *Mechanical Systems and Signal Processing*, 91: 1-9.

Abstract

Uncertainty quantification is an integral part of the model validation process and is important to take into account during the design of mechanical systems. Sources of uncertainty are diverse but generally fall into two categories: aleatory due to random process and epistemic resulting from a lack of knowledge. This work focuses on the behavior of solar arrays in their stowed configuration. To avoid impacts during launch, snubbers are used to prestress the panels. Since the mechanical properties of the snubbers and the associated preload configurations are difficult to characterize precisely, an info-gap approach is proposed to investigate the influence of such uncertainties on design configurations obtained for different values of safety factors. This eventually allows to revise the typical values of these factors and to reevaluate them with respect to a targeted robustness level. The proposed methodology is illustrated using a simplified finite element model of a solar array.

Author keywords

Epistemic uncertainty, Info-gap theory, Robustness, Prestressed structure, Mechanical contact