Advances in Probabilistic Methods

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Advances in probabilistic methods to support the design of mechanical systems is now moving to the engineering desktop. Basic modeling strategies are understood and in use in many applications. There are still issues to be resolved in the application of these methods to reliability critical applications. Some of these issues will be highlighted. At the same time, the design of complex aerospace systems requires more than just probabilistic methods as we know them now. The presentation will review a recent study by its author on the development and application of non-traditional and non-deterministic methods new methods to the life cycle design and analysis of extremely complex aerospace systems. Not only "traditional" mathematical analysis methodologies (such as mathematical optimization, Bayesian methods, or robust statistical design) are reviewed, but also "soft" or "non-traditional" methods (such as neural networks, fuzzy logic or genetic algorithms). In particular, emphasis will be given to the synthesis of many of these elements into the design systems of the future.