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Nota di contenuto	Probabilistic Design for Optimization and Robustness for Engineers; Contents; Preface; Acknowledgments; 1 New product development process; 1.1 Introduction; 1.2 Phases of new product development; 1.2.1 Phase I-concept planning; 1.2.2 Phase II-product planning; 1.2.3 Phase III-product engineering design and verification; 1.2.4 Phase IV-process engineering; 1.2.5 Phase V-manufacturing validation and ramp-up; 1.3 Patterns of new product development; 1.4 New product development and Design for Six Sigma; 1.4.1 DfSS core objectives; 1.4.2 DfSS methodology; 1.4.3 Embedded DfSS; 1.5 Summary Exercises2 Statistical background for engineering design; 2.1 Expectation; 2.2 Statistical distributions; 2.2.1 Normal distribution; 2.2.2 Lognormal distribution; 2.2.3 Weibull distribution; 2.2.4 Exponential distribution; 2.3 Probability plotting; 2.3.1 Probability plotting-lognormal distribution; 2.3.2 Probability plotting-normal distribution; 2.3.3 Probability plotting-Weibull distribution; 2.3.4 Probability plotting-exponential distribution; 2.3.5 Probability plotting with confidence limits; 2.4 Summary; Exercises; 3 Introduction to variation in engineering design 3.1 Variation in engineering design3.2 Propagation of error; 3.3

Protecting designs against variation; 3.4 Estimates of means and variances of functions of several variables; 3.5 Statistical bias; 3.6 Robustness; 3.7 Summary; Exercises; 4 Monte Carlo simulation; 4.1 Determining variation of the inputs; 4.2 Random number generators; 4.3 Validation; 4.4 Stratified sampling; 4.5 Summary; Exercises; 5 Modeling variation of complex systems; 5.1 Approximating the mean, bias, and variance; 5.2 Estimating the parameters of non-normal distributions
5.3 Limitations of first-order Taylor series approximation for variance5.4 Effect of non-normal input distributions; 5.5 Nonconstant input standard deviation; 5.6 Summary; Exercises; 6 Desirability; 6.1 Introduction; 6.2 Requirements and scorecards; 6.2.1 Types of requirements; 6.2.2 Design scorecard; 6.3 Desirability-single requirement; 6.3.1 Desirability-one-sided limit; 6.3.2 Desirability-two-sided limit; 6.3.3 Desirability-nonlinear function; 6.4 Desirability-multiple requirements; 6.4.1 Maxi-min total desirability index; 6.5 Desirability-accounting for variation
6.5.1 Determining desirability-using expected yields6.5.2 Determining desirability-using non-mean responses; 6.6 Summary; Exercises; 7 Optimization and sensitivity; 7.1 Optimization procedure; 7.2 Statistical outliers; 7.3 Process capability; 7.4 Sensitivity and cost reduction; 7.4.1 Reservoir flow example; 7.4.2 Reservoir flow initial solution; 7.4.3 Reservoir flow initial solution verification; 7.4.4 Reservoir flow optimized with normal horsepower distribution; 7.4.5 Reservoir flow optimized with normal horsepower distribution verification
7.4.6 Reservoir flow horsepower variation sensitivity

Sommario/riassunto

Probabilistic Design for Optimization and Robustness: Presents the theory of modeling with variation using physical models and methods for practical applications on designs more insensitive to variation. Provides a comprehensive guide to optimization and robustness for probabilistic design.Features examples, case studies and exercises throughout. The methods presented can be applied to a wide range of disciplines such as mechanics, electrics, chemistry, aerospace, industry and engineering. This text is supported by an accompanying website featu