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Risk Management for Safety and Quality in Space Programs (1)

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STUDY FOR PROCESS RELIABILITY MODELING AND CONTROLLING METHOD OF SPACE PRODUCT

Abstract

The inner collection between process reliability and stable process of space product is analysed, and the model of controlling-detecting process parameters is built by multiple linear regression technology. Then the extremum and mean value of multivariable controlling parameters' expected value, which meet the requirement of process detecting parameters' stability, are used to predict each mean response and new response, and also prediction ellipsoid and joint confidence intervals of detecting parameters are got. Furthermore, three optimization problems based on genetic algorithm, which focused on controlling parameters' fluctuation interval, are studied. Finally, space product ferrite phase shifter's coating is explained correctness of the method as a typical case. Thus, the significant guarantee is provided for improving space products' quality. Key wordsProcess stability; Multivariable linear model; Predict; Control

Although current research results push development of space products' process reliability, there is short of quality assurance from the point of process stability and process parameters. The paper argues that process stability is the significant description of stable production, and keeping process stability is the requirement to ensure stable production, at the mean time, process stability will constantly improve the rationality, scientificalness, and economy of production technology program of from the point of production cycle, manufacturing costs and safety. As a consequence, building stable process parameters relationships and determining fluctuation range of parameters are the important technological approaches to ensure space products' quality and reliability by optimizing process parameters.

1)The original controlling range of detecting parameters[λ1,λ2b] can be simplified as [a,b] , when k=λ1/λ2=1 , the best fluctuation interval of controlling parameters must be got on the symmetric interval for the linear process and weakly nonlinear process.

2)It can be inferred that controlling range of detecting parameters is asymmetric interval when k=λ1/λ2=1>1 and k=λ1/λ2=1<1 , the best fluctuation interval of controlling parameters must be got on the asymmetric interval for the nonlinear process.

A.When the objective function is that 'the product of controlling parameters' fluctuation range is largest', the optimization model is ...

B.When the subject function is that ‘the minimum fluctuation range of controlling parameters is largest’, the optimization model is ...

C.When the subject function is that ‘the summation of controlling parameters’ fluctuation variation is largest, the optimization model is...