

**A Bayesian Approach for Multiple Response Surface Optimization  
in the Presence of Noise Variables**

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**ABSTRACT**

An approach for the multiple response robust parameter design problem based on a methodology by Peterson (2000) is presented. The approach is Bayesian, and consists of maximizing the posterior predictive probability that the process satisfies a set of constraints on the responses. In order to find a solution robust to variation in the noise variables, the predictive density is integrated not only with respect to the response variables but also with respect to the assumed distribution of the noise variables. The maximization problem involves repeated Monte Carlo integrations, and two different methods to solve it are evaluated. A Matlab code was written that rapidly finds an optimal (robust) solution in case it exists. Two examples taken from the literature are used to illustrate the proposed method.