

研究、探讨

分块响应面法研究

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摘要 在对采样点构建插值曲面时, 响应面法 (Response Surface Method, RSM) 通常是对整个曲面进行插值近似, 由于计算量的原因, 采用的近似曲面阶数通常不超过四阶。但是, 对于高度非线性的曲面, 使用低阶响应面在较大范围内近似毫无疑问会降低响应面的近似精度。分块响应面法采用一定的策略对近似空间进行合理分块, 缩小响应面的近似范围, 从而提高了响应面在该空间的近似精度。测试结果表明, 在样本数量和样本空间变化时, 分块响应面法的近似精度不低于响应面法, 尤其是当样本数量较多时, 分块响应面法的近似精度要远高于响应面法。这就使得分块响应面法能够有效地应用于多学科设计优化。

关键词 [分块响应面法](#) [近似模型](#) [多学科优化](#)

分类号

Research on Improved Response Surface Method (IRSM)

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Abstract

When constructing an approximation surface with Response Surface Method (RSM), the approximation surface usually covers the whole interpolating space. Because of the cost of computation, the order of the approximation surface usually is below four. However, when constructing an approximation surface for a nonlinear surface in large space with low order response surface, the accuracy of approximation will be absolutely very low. Actually, it's easily concluded from the Taylor theory that the response surface can only have good accuracy in small space. The Improved RSM (IRSM) raised in this paper divides the interpolating space into several small subspaces, which will reduce the scale of the space that the RSM has to cover, and improves the accuracy of RSM. The result proves that the accuracy of IRSM is never below the RSM no matter what the number of sample point is. If the number of sample points is large, the approximating accuracy of IRSM is much higher than the RSM, which makes the IRSM is more suitable for the MDO.

Key words [Improved Response Surface Method \(IRSM\)](#) [approximation model](#) [multidisciplinary design optimization](#)

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