基于蒙特卡罗法的螺旋锥齿轮接触疲劳可靠性分析

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关键词： 螺旋锥齿轮 接触疲劳 可靠性 蒙特卡罗

摘　要： 运用蒙特卡罗法模拟确定了齿轮接触疲劳应力与强度分布，并对接触疲劳可靠度进行了模拟，克服了齿轮等重要零部件的小样本的问题。分析可知，齿轮接触疲劳应力服从正态分布，接触疲劳强度服从对数正态分布，并且齿轮接触疲劳的可靠度误差随着模拟次数的增加而逐渐减小。对影响接触疲劳可靠性的应力随机参数进行敏感性分析，结果表明，应力均值对接触疲劳可靠度的影响大，应力标准差对接触疲劳可靠度的影响较小。Monte-Carlo method was applied to simulate the distribution of the contact fatigue stress and the contact fatigue strength of spiral bevel gear, furthermore, reliability was also simulated. The method solved the small sample problem. According to the analysis, the contact fatigue stress of the gear submitted the normal distribution, and the strength of the gear obeyed the lognormal. The reliability error of the contact fatigue was reduced with the increase of the simulation times. Sensitivity analysis has been made on the stress random parameters which probably impacted the contact fatigue reliability of the gear. Results revealed that the affection of mean is remarkable to the reliability of the gear. The standard error is relatively small.

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