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航空公司机队设备可靠性非线性动态评估模型

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Nonlinear Dynamic Assessment Model of Airline Fleet Equipment Reliability

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摘要

机队设备可靠性是实现航空公司“安全、正点和经济”目标的核心内容,对其进行评估是实现机队设备系统综合技术保障的重要手段。根据航空公司机队设备可靠性统计、数据采集和监控方式的关键技术与重要环节,应用物理-事理-人理 (WSR)思想和Delphi法,建立了机械原因使用困难报告(SDR)和非计划停场率等航空公司机队设备可靠性的5大指标体系。基于灰色聚类方法和反步(BP)神经网络的优缺点,结合机队设备可靠性的随机性和波动性,设计了航空公司机队设备可靠性非线性动力学评估模型。航空公司机队设备可靠性评估实例的分析表明:该可靠性非线性动态评估模型是可行的,能够实现动态和静态的评估。

关键词: 航空公司机队 评估模型 可靠性 BP神经网络 灰色聚类

Abstract:

The reliability of the fleet equipment is at the core of an airline company's effort to achieve its goal of safety, punctuality and economy. The assessment of the reliability of the fleet equipment is an important means to realize the comprehensive technological guarantee of a fleet equipment system. In accordance with the key technology in statistics and data acquisition and the monitoring of the reliability of the fleet equipment, five indicator systems of the fleet equipment reliability, including service difficulty reports (SDR) and the rate of nonscheduled downtime etc., are set up by the Wuli-Shili-Renli (WSR) theory and the Delphi method. In consideration of the features of randomness and volatility of fleet equipment reliability, a nonlinear dynamic assessment model of fleet equipment reliability is designed based on the advantages and disadvantages of grey clustering and back propagation (BP) neural network. The analysis of an application case of the model shows that the nonlinear dynamic assessment model is feasible and applicable to both static and dynamic assessments.

Keywords: airline fleet assessment model reliability BP neural network grey clustering

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