

基于动态指数平滑模型的小批量制造过程质量预测

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关键词: 预测 质量控制 小批量 动态指数平滑模型 加工误差

摘要: 在对传统指数平滑预测模型局限性分析的基础上,通过引入动态平滑参数和动态平滑初值的概念,提出一种能自动适应预测进程的新模型,并将其应用于小批量生产过程的预测补偿控制领域。通过基于最速梯度法的优化算法,模型的动态平滑参数和平滑初值能随着新观测值的加入而自动调整。将该模型作为关键技术应用于柱塞套内孔加工质量预测,并与时序AR模型、灰色GM模型及传统指数平滑模型的结果进行对比,表明提出的模型具有一定的优越性。After analyzing the deficiency of traditional exponential smoothing prediction model, a novel prediction model with the concepts of dynamic smoothing parameter and initial value was proposed and applied to prediction compensation-control in small-batch production. In the presented model, with an optimal algorithm based on steepest-descent, the dynamic smoothing parameter and initial value were adjusted with new sample of the time-series automatically. Moreover, the presented model was used as the key technology of quality predicting in machining plungers of oil pump mouth, the practical results showed that compared with auto-regressive (AR), gray and traditional exponential smoothing model, the presented one is higher in precision and better in adaptation.

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