

基于TSPSO支持向量机红外甲烷传感器动态补偿

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摘要:

摘要: 针对红外甲烷传感器在矿井下使用易受周围恶劣环境因素影响的问题, 提出了一种动态感知的双子群粒子群-支持向量机(TSPSO-SVM)补偿算法对其进行动态补偿。TSPSO算法同时优化非目标环境变量和SVM参数, 其寻优精度高、收敛速度快, 并在此基础上建立了综合补偿数学模型。实验表明, 该补偿算法回归拟合效果好, 模型的测量精度高于一般的粒子群最小二乘支持向量机(PSO-LSSVM)模型。

关键词: 关键词: 红外甲烷传感器; 粒子群; 支持向量机; 动态补偿; 非环境变量。

Dynamic Compensation of Infrared Methane Sensor Based on TSPSO-SVM

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Abstract:

Abstract: Under the circumstances of coal mining applications, how to eliminate the bad measurement accuracy owing to the harsh surroundings appears to be very important. So Two-Subpopulation Particle Swarm Optimization-Support Vector Machine (TSPSO-SVM) is proposed to dynamically compensate it. The Two-Subpopulation Particle Swarm Optimization algorithm optimizes the non-target environment variables and also searches the parameters for SVM at the same time. As a result, this algorithm has smaller optimization error and improves the performance of convergence greatly. Finally a mathematical model of comprehensive compensation is established successfully. Experiments show that the compensation algorithm has good regression results and its measurement accuracy is better than the common model such as Particle Swarm Optimization-Least Squares Support Vector Machine (PSO-LSSVM) model.

Keywords: Key words: infrared methane sensor; PSO; support vector machine; dynamic compensation; non-target environment variable.

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