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摘要

关键词

中图分类号

文献标识码

文章编号

The Modified Grey Prediction Model and Its Application in Deformation Monitoring

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1 前言

2 GM (1, 1) 模型^[5]

$$X^{(0)} = (x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(n))$$

$X^{(0)}$

$$X^{(1)} = (x^{(1)}(1), x^{(1)}(2), \dots, x^{(1)}(n))$$

$$X^{(1)}(k) = \sum_{i=1}^k x^{(0)}(i), k=1,2,\dots,n$$

$$x^{(0)}(k) + a \cdot z^{(1)}(k) = b$$

$$x^{(0)}(k) \quad a$$

$$MSE = \frac{1}{n} \sum_{k=1}^n (X^{(0)}(k) - \hat{X}^{(0)}(k))^2 (k=1,2,\dots,n)$$

$$B = \begin{bmatrix} -z^{(1)}(2) & 1 \\ -z^{(1)}(3) & 1 \\ \vdots & \vdots \\ -z^{(1)}(n) & 1 \end{bmatrix} \quad Y = \begin{bmatrix} x^{(0)}(2) \\ x^{(0)}(3) \\ \vdots \\ x^{(0)}(n) \end{bmatrix}$$

$$z^{(1)}(k) = \alpha \cdot x^{(1)}(k) + (1-\alpha) \cdot x^{(1)}(k-1), k=2,\dots,n \quad X^{(1)}$$

$$m^{-X^{(0)}} (m > 1) \quad X_1^{(0)} \quad X^{(0)} \quad X_1^{(0)} =$$

$$\begin{bmatrix} a \\ b \end{bmatrix} = [B^T B]^{-1} B^T Y$$

$$X_1^{(0)} \quad \hat{X}_1^{(0)} \quad \hat{X}^{(0)} = -\log_m^{-\hat{X}_1^{(0)}} \quad X^{(0)}$$

$$\frac{dx^{(1)}}{dt} + a \cdot x^{(1)} = b \quad X_2^{(0)}$$

$$x^{(1)}(t) = \left(x^{(1)}(1) - \frac{b}{a} \right) e^{-at} + \frac{b}{a}$$

$$q(p < 0, pX^{(0)} + q > 0) \quad X_2^{(0)} \quad X_2^{(0)} = pX^{(0)} +$$

$$\hat{x}^{(0)}(k+1) = (1-e^a) \left(x^{(0)}(1) - \frac{b}{a} \right) e^{-ak} (k=1,2,3,\dots,n)$$

$$X_2^{(0)} \quad \hat{X}_2^{(0)} \quad \hat{X}^{(0)} = \frac{X_2^{(0)} - q}{p}$$

3 灰色预测模型的改进

$$\rho(k) \quad X^{(0)}$$

$$\rho(k) = \frac{x^{(0)}(k)}{\sum_{i=1}^{k-1} x^{(0)}(i)} (k=2,3,\dots,n)$$

4 实验分析



