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基于支持向量机改进SMO算法的直升机旋翼自转着陆过程建模

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Modeling for Landing Process of Helicopter with Rotator Self-rotating Based on Modified SMO Algorithm of Support Vector Machine

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摘要

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摘要 为了建立高精度的直升机仿真模型,把支持向量机(SVM)引入到直升机智能化建模领域,建立了直升机自转着陆过程的旋翼转速模型。根据凸二次优化问题在对偶间隙为零时取得最优解的性质,对序列最小优化算法的停机准则进行改进,并用于所建模型的训练。仿真结果表明:与神经网络模型比较,这种SVM模型具有结构简单、运算速度快和泛化能力强等优点。

关键词: 支持向量机 建模 直升机旋翼 序列最小优化 仿真模型

Abstract: Aimed at building simulation model of helicopter with high precision, the support vector machine (SVM) method is introduced to the field of intelligent modeling for a helicopter. A simulation model of a helicopter with rotator self-rotating for the landing process is built. The global minimum of a quadratic programming will be reached when the dual gap is zero. According to this feature, the halt criteria in the sequential minimal optimization algorithm is modified, and the modified algorithm is applied to training the SVM simulation model. Compared with neural network model, it is shown by simulation results that the SVM simulation model of helicopter possesses some advantages, such as simple structure, fast convergence speed and high generalization ability.

Keywords: support vector machine modeling helicopter rotors sequential minimal optimization simulation model

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