

## 免疫小波网络在水轮机组故障诊断中的应用

Application of immune wavelet network model to fault diagnosis of hydro turbine generating units

中文关键词: [水轮发电机组](#) [故障诊断](#) [小波网络](#) [免疫](#)

英文关键词: [hydro turbine generating unit](#) [fault diagnosis](#) [wavelet network](#) [immune algorithm](#)

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中文摘要:

水轮发电机组的故障原因非常复杂, 目前尚难以通过理论分析在故障原因和故障征兆之间建立对应关系, 为此, 本文结合水轮发电机组的振动特点和小波网络的结构特点, 建立了免疫小波神经网络模型。在对小波网络结构参数进行优化时, 应用免疫系统的调节原理, 依据抗体的适应度和抗体浓度的大小来确定其选择概率; 并利用适应度函数动态调整交叉概率和变异概率。实例计算结果表明, 与实际诊断结果相符, 且该模型收敛速度快, 精度高并有较好的泛化能力。

英文摘要:

The corresponding relationships between causes and indications of fault in hydro turbine generating units have not been established by theoretical analyses, since the causes of faults occurred to hydro turbine generating units are very complicated. The wavelet network theory is introduced and the immune algorithm is applied to optimize the structural parameters of the wavelet network to establish the immune wavelet network model for improving the convergence speed of neural network computation in the process of fault diagnosis. The principle of regulation function of immune system is utilized in optimization of wavelet network parameters. The chosen probabilities are determined by the fitness function and density of each antibody, and the crossover probability and mutation probability can be regulated dynamically by using fitness function. The proposed model is used to simulate the fault diagnosis of a generator set. The result agrees with the prototype observation data and the characteristics of quick convergence, high accuracy and good generalization of this method are demonstrated.

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