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Adaptive Fuzzy-Based Approach for Clasification of System's States

Despite the considerable development of analytical model-based methods to design fault diagnosis of systems during the last years, these methods usually need an exact model of the considered system to design appropriate fault detection systems. For diagnostic purposes additionally more information is needed for classifying and distinguishing faulty states etc. In order to avoid this problem and to develop approaches allowing distinguishing more operational states (usually those which can not be modeled easily like different operational states for condition monitoring systems etc.), qualitative model-based and also signal-based methods have been developed based on different principles. The idea of this contribution is to combine qualitative model-based methods using fuzzy logic and statistical approaches describing and using signal properties. The developed data mining technique is used to design the knowledge base as base for a new type of condition monitoring systems based on available suitable signals, related measurements, and also initial information about the classification related states/conditions of the system. The automatic extraction of a related set of distinguishable features to the states/conditions of the system is the novel keystone of this technique. The practicability as well as validation of the proposed approach is achieved by using experimental results from a test rig to study friction and wear processes of a metal surface allowing the distinction of different wear states. The developed method gives promising results to distinct related states of wear and also to determine the quality of resulting model based on a proposed quality-oriented parameter.

Ключевые слова:

Содержание.
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