

# Reliable Faults Diagnosis of Roller Bearings using Hybrid Feature Models and Improved Multiclass Support Vector Machines with Classifiers Discriminant Analysis

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## ABSTRACT

In this paper, a reliable multi-fault diagnosis scheme based on hybrid feature models and improved one-against-all multiclass support vector machines (OAA-SVM) is proposed. First, distinct feature extraction methods are simultaneously applied on an acoustic emission (AE) signal to detect unique fault conditions about bearing defects. While a high dimensional features vector is further utilized with standard OAA-SVM classifier for classification, such method ignores individual classifier competence when results from multiple classes are agglomerated for making a final decision and therefore yields undecided and overlapped feature spaces where classification accuracy is severely degraded. To solve this unreliability problem, this study develops a dynamic reliability measure (DReM) technique for individual SVM in the OAA framework. This DReM accounts for the spatial variation of the classifier's performance by finding the local neighbor region of a test sample in the training sample space. Experiment results demonstrate that the proposed, OAA-SVM with DReM, classifier method outperforms the three state-of-the-arts.

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