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# A novel fault diagnosis scheme applying fuzzy clustering algorithms

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## Abstract

In this paper an approach to design data driven based fault diagnosis systems using fuzzy clustering techniques is presented. In this proposal, as a first part of the classification process, the data was pre-processed to eliminate outliers and reduce the confusion. To achieve this, the Noise Clustering and Density Oriented Fuzzy C-Means algorithms were used. Secondly, the Kernel Fuzzy C-Means algorithm was used to achieve greater separability among the classes, and reduce the classification errors. Finally, a third step is developed to optimize the two parameters used in the algorithms in the training stage using the Differential Evolution algorithm. The proposed approach was validated using the nonlinear continuous stirred-tank reactor. The obtained results indicate the feasibility of the proposal.

*Keywords:* Fault diagnosis, Fuzzy clustering algorithms, Fuzzy kernel algorithms, Optimal parameters.

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## 1. Introduction

In current industries, there is a marked necessity to improve the processes efficiency in order to produce with higher quality besides attending the

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