

CONDITION DETERMINED MAINTENANCE – THE USE OF MATHEMATICAL TAXONOMY FOR AUTOMATIC FAULT DIAGNOSIS

Knowledge based systems have been identified as providing a number of powerful methods for automatic data analysis. As part of the Condition Determined Maintenance (CDM) project, a number of these techniques are being investigated. This report is a discussion of the theory and method involved in one of these techniques, known as mathematical taxonomy.

Mathematical Taxonomy has great potential in areas where rapid diagnosis of complex situations is needed. The techniques are relatively simple to code, easy to embed into existing computer applications, and have the potential to become self-learning.

The report provides a detailed analysis of Mathematical Taxonomy, and includes a grounding in the theory of cluster analysis, the mathematical methods available to identify clusters, and the different techniques available to allow recognition of new samples. The ways in which these techniques can be applied to create knowledge based systems is also discussed.

Finally, a number of practical considerations are addressed, especially in the areas of system development and optimisation, and the details are provided of the taxonomic development software package which has been created as part of the CDM project.