



ISTITUTO ITALIANO
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TITLE

Method for generating a minimum set of analytical redundancy relations for the diagnosis of systems

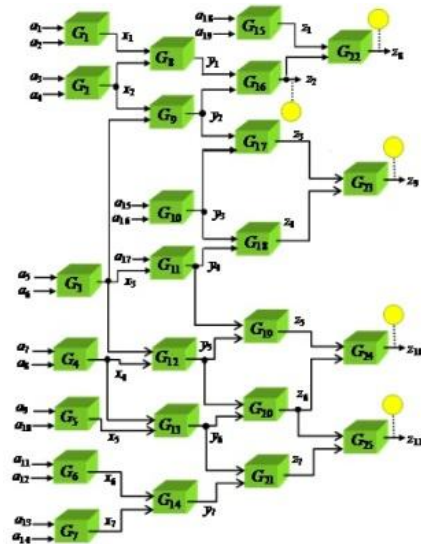
INVENTORS

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DESCRIPTION

A novel concept of Minimal Set of Analytical Redundancy Relation (ARRs) and an efficient method for its calculation for application to system diagnosis is developed.

Starting with the complete set of ARR for a system and the resulting Fault Signature Matrix for any number of considered faults, there can be smaller sets of ARR which achieve the same level of detection and isolation as the complete set of ARR. The derivation of minimal set of ARR can be formulated as a 0-1 integer programming problem and consequently, an efficient branch-and-bound method for its solution is presented. Instead of simple measure of the cardinality of the subset of ARR, the concept of minimality can be extended to the real computational cost of evaluating ARR for diagnosis. In fact, many practical systems might involve some components with nonlinear functions which are more costly and/or less precise for computation than other components of the system with simpler function. For such cases, once the ARR of the system are derived, a careful analysis can reveal those ARR which involve such costly and/or less precise components. The calculation of minimal set of ARR can then be performed by assigning a computation and/or precision cost to each ARR and the result will be a set of ARR with minimal cost.



APPLICATIONS

The method can be applied to all the systems involving some components with nonlinear functions which are more costly and/or less precise for computation than other components of the system with simpler function.

KEYWORDS

ARR, analytical redundancy relation, system diagnosis

BIBLIOGRAPHIC DATA

1) Procedimento per la derivazione di un insieme minimo di relazioni di ridondanza analitica per la diagnosi di sistemi

Application Number	TO2010A000164
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Applicants	Fondazione Istituto Italiano di Tecnologia

2) A method for generating a minimum set of analytical redundancy relations for the diagnosis of systems

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