INFORMATIK

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Dimensional Stability of Biaxially Oriented Polymer Disks

In order to increase storage density, which is the main objective of magnetic recording technology, dimensional-changes of magnetic tape due to creep and stress relaxation have to be well understood. An analysis is given of the isothermal, quasisteady creep of a rotating, biaxially oriented polymer disk. The theoretical predictions are compared with experimental results obtained on such a configuration.

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Blocking the Loops of a Flow-Graph

The present note examines a relatively old problem of directed graphs and its interpretation on flow-graphs. It can be considered as a contribution to the properties of structured programs [1].

We are going to consider elementary cycles in a directed graph, i. e. cycles in which no points occur more than once. Two cycles are *point-independent,* if they have no common points. A set of points is a *blocking point-set,* if it contains a point from every cycle. $\nu_p(G)$ denotes the maximal number of the pairwise point-independent cycles of G. $\tau_p(G)$ denotes the minimal number of points in a blocking point-set of G. (G denotes a directed graph.) Obviously $\nu_p(G) \leqq \tau_p(G)$. The simplest example to show that $\nu_p(G) \neq \tau_p(G)$ can be seen on figure 1:

The graph of Fig. 2 is called a *double-entry cycle on P.*

The next theorem gives a sufficient condition for $\nu_p(G) = \tau_p(G)$.

Theorem 1. *Let G be a directed graph and P be a point of G. If*

A. *every point of G lies on a directed path starting from P;*

B. *G contains no double-entry cycle on P,*

then $\nu_p(G) = \tau_p(G)$.

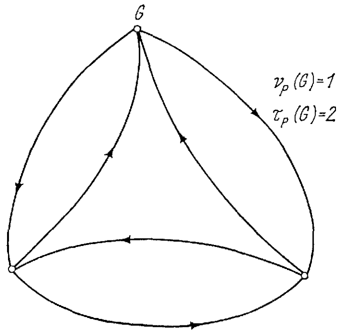

Fig. 1.

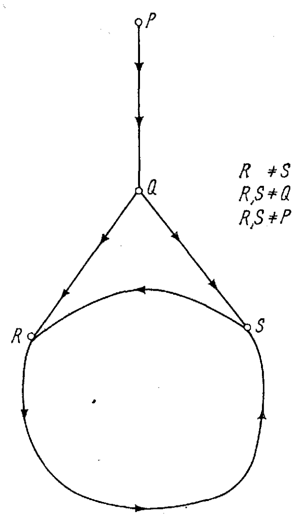

Fig. 2. A double-entry cycle

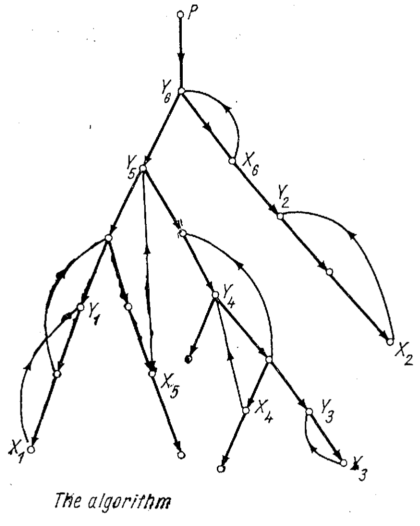

Fig. 3. The algorithm

Theorem 2. *With the conditions of theorem 1 a minimal blocking set can be built up with the following algorithm*:

0. *Let T be a directed spanning tree of G with root P.*
1. *Stop if T has no edges.*
2. *Choose a minimal Y so that there is an XY edge with $X < Y$*[1]. *Stop if no such Y exists.*
3. *Delete Y and the subtree under Y from T. The remaining tree will be considered as T.*
4. *Y is put to the blocking set and continue with step 1.*

In the case of flow-graphs [2] the points in a blocking set can be interpreted as control points where all loops of the computation can be checked. Our theorems can be applied to fully reducible flow-graphs [2] and flow-graphs reducible to a D-chart [3].

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[1]) In the partial order defined by T.

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A Numerical Approach to the Transverse Vibrations of a Clamped Rotating Disk

A typical disk memory consists of a thin circular plate, spinning at high speed, upon which data are recorded. For a uniform spacing between the disk and the recording head a detailed understanding of the dynamic behavior of the disk is necessary.

The phenomenon of transverse vibrations of an elastic disk is well known, and for special cases the solutions have been calculated. In this paper, the general solution for the free vibrations of a centrally clamped spinning membrane disk is developed in terms of the eigenfunctions in the circumferential and radial direction. In the circumferential direction these functions are the circular functions, while in the radial direction the functions are similar to the hypergeometric functions. Numerical results of the frequencies and associated mode shapes are presented for some typical disk configurations.

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