SOME PROPERTIES OF THE NON-INTEGRAL VERTICES OF THE RELAXATION POLYTOPE OF THE LINEAR ORDERING PROBLEM

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We consider relaxation polytope of the linear ordering problem

$$0 \leqslant x_{ij} \leqslant 1, \quad x_{ij} + x_{ji} = 1, \quad 0 \leqslant x_{ij} + x_{jk} - x_{ik} \leqslant 1,$$

$$i \neq j, \quad i \neq k, \quad j \neq k, \quad i, j, k = 1, \dots, n. \tag{1}$$

We denoted polytope (1) by B_n. Polytope B_n has integral vertices corresponding one-to-one to admissible solutions of the linear ordering problem as well as the non-integral vertices.

Definition 1. If x_0 is a non-integral vertex of the polytope B_n on the set $I \subset 1, \dots, n$ and for each equality of the system equalities that gives the solution x_0, there exists such a basis that changing this equality to the opposite value we obtain adjacent integral vertex at the set I.

About facet non-integral vertices of the polytope B_n you can see in [1].

Theorem 1. *If x^0 is facet non-integral vertex of the polytope B_n, then all the non-integral coordinates receive values* $1/2$.

Theorem 2. *If x^0 is facet non-integral vertex of the polytope B_n on the set $I \subset 1, \dots, n$, where all the non-integral coordinates do not receive values $1/2$, then it is possible to find corresponding facet non-integral vertices with the help of polynomial algorithm.*

In the paper [2] is considered an example, where for the non-integral vertex containing non-integral coordinates do not receive values 1/2,were obtained corresponding facet non-integral vertices.

References

1. *Bolotashvili G.G.* The canonical relaxation polytope of the linear ordering problem // Bulletin of the Georgian academy of sciences. 2005. V. 171, N. 3. P. 445–448.

2. *Bolotashvili G.G.* The examples of non-integer vertices of the linear ordering problem and their structure // Reports of Enlarged Session of I. Vekua. Institute of Applied Mathematics. 2005. V. 20, N. 1–3.