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PARALLEL COMPUTATIONS IN THE ALGORITHM OF THE GOMORY FOR SOLVING THE PROBLEM OF LOCATING THE PHYSICAL FIELD SOURCES

Large volumes of computation require not only accurate, but also fast results. To increase the efficiency of the calculation of tasks, different approaches and methods of parallelization are used, that is, there is a breakdown of the algorithm into blocks or separate branches that are transmitted to the processors and can be rotated independently of each other.

In order to improve the Gomory algorithm for solving the problems of locating sources of physical field, methods for partitioning the processor capability of a computer have been analyzed and investigated, and one that can be applied to this algorithm is chosen.

The approach that has been chosen is called the Fox algorithm, which includes a conveyor and parallel operations. Its basic principles are:

- parallelization of essentially sequential operations. In this case, this is the transition from one simplex table to another, that is, finding a corner point on the output. By the same principle, the construction of the cut off at each step occurs;
- the connection of processors in such a way that the result of the work of one processor falls on the input of another (linear topology);
- splitting a complex operation into several successive stages, each of which runs its own processor.

We have the basic algorithm:

- processor 1 transmits processor data 2;
- processor 2 adds its data and passes to the processor 3 and so on until the LP solution is obtained. The result is passed to the beginning of the processor 1;
- processor 1 starts checking the integer condition. If the solution does not satisfy the conditions, then a parallel implementation is applied, where each processor calculates its effect, namely, it seeks a fractional part of the free member of the string that does not conform to the integer conditions. And at the end, each processor gives its results of calculations, from which the maximum fractional part is chosen.
- all the results of the calculations of each of the processors are returned to the processor 1, resulting in solving line and the decoupling element;
- the correct cutoff is constructed and the process is repeated again to obtain the optimal solution of the problem: integer or partially integer.

Analysis of the effectiveness of the algorithm. Time Score:

The time of parallel calculations consists of the time of the processor and the time of transfer execution (1):

$$k_e = \frac{\mathbf{T_1}}{T_p} = \frac{\mathbf{1}}{\frac{q}{n} + \frac{2q(p-1)\tau_0 + \tau_c \log_2 p}{2n^2 - n}} \quad (1)$$

Time to solve m tasks on one processor for the conveyor will look like: $T_1 = mpt$
And its acceleration (2):

$$k_e = \frac{\mathbf{mpt}}{(p-1)t_0 + pt + (m-1)(t + t_0)} \quad (2)$$

After examining the parallelization algorithms, we can conclude that the Fox algorithm, compared with others:

- sufficiently effective at large dimensions of the matrix;
- possibility of parallelization of principally successive operations;
- possibility of simultaneous execution of data transmission and processing (asynchronous operations);
- at parallel use, synchronization is needed, which reduces efficiency. But in this case, the calculations do not contain a large amount of data.

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