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Predlahaetsya method of analysis bandwidth abilities of machinery and transport complex for grain crops and Improvement ego parameters in Application perehruzochnoy technology.

Ability Propusknaya, zernouborochnые kombaynы, perehruzhately-trailers, vans, analysis, methods, parameters of processes.

The technique of analysis bandwidth machine-transport complex for crops and improvement of its parameters in application of technology overload.

Trackcapacity, combineharvesters, trailers-unloaders, cars, theanalysis, technique, parametresofprocesses.

UDC 636.1

Analysis of numerical method for interchange PROBLEMS Applied Physics (in agriculture)

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The above analysis of numerical methods for solving the problem of Applied Physics (processes in agriculture), which accelerates and increases the effectiveness of the solution of the latter.

Numerical methods, applied physics, finite differences, finite element method, discrete element method.

Problem. Now the solution of differential and integral equations arising in the solution of problems of applied physics, by means of numerical methods on a personal computer. Application of the latter makes it possible to simplify the process of resolution and increases the reliability of the results, and the use of computer software packages provides complete automation of the process [1]. Therefore, analysis of numerical methods for solving the problem of Applied Physics (processes in agriculture) is relevant. Finite differences (ICC) - commonly known (simple) interpolation method [2]. Its essence is to replace the differential coefficients in the equation for the coefficients of the difference that allows to reduce solving the differential equation to solve

the equation analogue its differences, that is to build end-riznychnu circuit solution corresponds to an approximate solution of the original differential equation. Consider the quadratic polynomial p (t) = $2t^2$-3t +2 and assume that we know him tabulated values (Table 1) (single factor experiment) p (0), p (0,1), p (0,2) , p (0,3), p (0,4) and t. e.

In the first column of the table contains the values of polynomial second -riznytsyu between two upper (neighboring) of the first column, and the third - the difference between two adjacent the second column. You can see that

value in the third column - the same. This is no accident. When we fill a table of any polynomial degree n, the number of column n + 1 will always contain a constant. This crucial fact makes operational this method [3].

Table 1. Estimated polynomial of degree 2, which describes the average size of particles (grinding time, h) during the grinding feed.

1	2	3
p(0) = 2.0		
	2,0-1,72 = 0.28	
p(0,1) = 1.72;		0,28-0,24 = 0.04
	1,72-1,48 = 0,24	
p(0,2) = 1.48		0,24-0,20 = 0.04
	1,48-1,28 = 0,20	
p(0,3) = 1.28		0,20-0.16 = 0.04
	1,28-1,12 = 0,16	
p(0,4) = 1.12		

The process of creating (filling) can be extended to infinity. The value we obtain a polynomial with no multiplication. It is this property of polynomials was based work machine differences Charles Babbage. To perform each subsequent cycle calculation values polynomial of the second degree, enough to keep the number 2 (the last items in the first and second column). For tabulation polynomial p values greater number needed - namely equal claim.

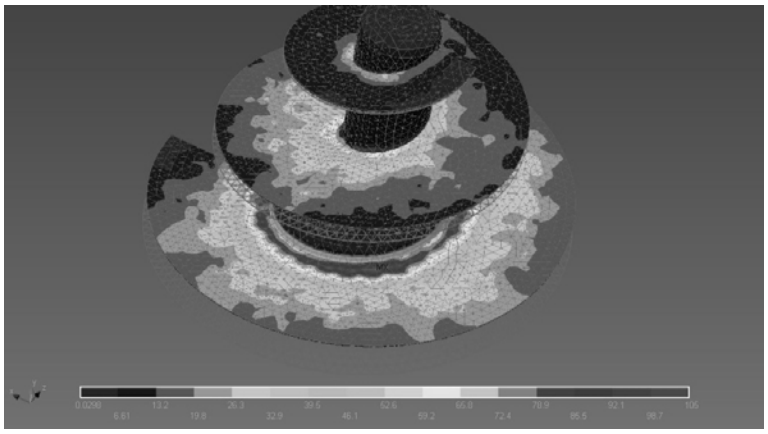
Finite element method (FEM, FEM) - numerical method for solving differential equations with partial derivatives and integral equations arising in the solution of problems of applied physics [4, 5]. The method is widely used to solve problems in mechanics of solids, deformable, heat transfer, fluid dynamics and electrodynamics.

The method is reflected in its title. The area in which the searched solution of differential equations, finite number divided by regions (cells).

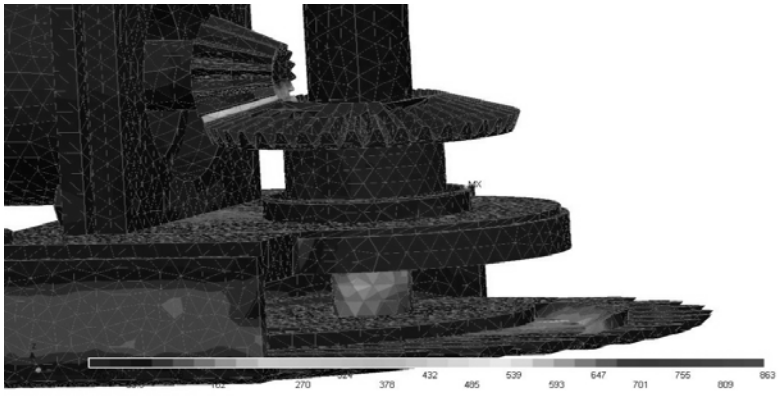
Each of the elements selected type of function approximation (easiest is first degree polynomial). Beyond their function element zero. Value functions on the boundaries of elements (nodes) is the solution of problems which are not known in advance.

The coefficients of the approximation functions usually are found in conditions of equality neighboring values of functions on the boundaries between elements (nodes). Then these factors are expressed in units of value functions in elements (Fig. 1).

It consists of a system of linear algebraic equations. Number of equations equal to the number of unknown values in the nodes. Which are found in the solution of the original system, which is directly proportional to the number of elements and limited by the capacities of electronic computer facilities (EBM). Thus each element is connected with a limited number of neighboring system of linear algebraic equations is sparse appearance, which greatly simplifies its solution.



and



to

Fig. 1. Visualization strain distribution on the surface: and - screw screw [6, 7], - a rotary type machines stryhalnoyi [8, 9].

In terms of vy'chislitel`noj mathematics, are ideas Finite Element contains that minimize the functional variational problem carried on aggregate functions, each of which is defined in its near field. This allows

for the numerical analysis of the system consider it as one of the specific branches diakoptics (general method of research by their division).

FEM difficult for the ICC to implement. In FEM, a number of advantages that are solved real problems with arbitrary shape region of the treated mesh is a rare opportunity in a place where great accuracy is required.

For a long time prevented the widespread lack of FEM algorithms for automatic partitioning region "almost equilateral" triangle (error depends on the variation method and inversely proportional to the sine or very acute or obtuse angle at the same partition). This problem was solved by the algorithm based on Delaunay triangulation.

This in turn made it possible to create a fully automated CAD kintsevoelementni. Virtually all modern calculations of strength carried out using FEM.

Discrete element method (MDE, DEM) - a family of numerical methods used in The problem with a lot of moving parts, such as molecules, dust, gravel and other granular media [10]. In 1985, he was detailed theoretical foundations, which showed that the DEM can be considered as a generalization of FEM.

The theoretical basis of the method and the possibility of its application repeatedly raised at the 1st, 2nd and 3rd International Conference on Discrete element method.

Modeling starts with a MDE all particles in the specified location and provide them with the initial rate. Then the forces acting on each particle is calculated based on the initial data and the relevant physical laws.

The forces that influence the macroscopic model:

- friction;
- repulsion;
- Gravity (only astronomical simulation).

At the molecular level:

- Coulomb force;
- Paul repulsionand;
- Van der Waals force.

Models in the dynamics divide the space in which the modeled process, the cells (finite volumes (ICE) [11]). Particles passing through one side of the cell is simply inserted into the other neighbor (periodic boundary conditions), the same thing happens to own. The forces are no longer taken into account after the so-called cut-off distance (typically half the length of the cell), so the share does not affect mirror image of the same particles on the other side the next cell. So is it possible to increase the number of shares a simple increase in cells.

All force is to find the resultant force acting on each particle. In order to determine changes in the position and velocity of each particle at a certain period of time (step) using Newton's law - otherIntegration of (or algorithm Verleta,Speed Verleta or jump method). Then the new position is used to calculate the forces for the next step, the cycle is repeated as long until the simulation ends.

FEM sometimes called molecular dynamics (MD), even when the particles are not molecules.

MDE very demanding to computer resources calculations. This limits the size of the partition coefficient model or models. Part of this restriction is to lift using parallel processing.

The method is based on the fundamental assertion that the material consists of separate, discrete particles. These particles may have different properties and surface, for example:

- liquid solvents (petrol);
- bulk materials (grains);
- granular material (feed)
- powder (flour).

MDE used in the following industries:

- pharmaceuticals;
- oil and gas;
- Agriculture;
- hirskodobuvna.

After the analysis of numerical methods should be noted that FEM is advisable to apply under static load objects and structures, and MDE in kinematic and dynamic research environments vehicles.

Conclusion. The use of numerical methods using computers enables accelerate and increase the efficiency of research processes and machines in their design in most industries, particularly in agriculture.

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BROUGHT chyslennыh analysis methods for solutions of problems Applied physics (processes in the s / s), something uskoryaet povыshaet Efficiency and process solutions past.

Chyslovыe methods, Applied Physics, Finite difference method, the method of finite elements method dyskretnыh elements.

Analysis of numerical methods for problem of solving applied physics (processes in agricultural) is resulted, that accelerates and raises efficiency of process of the solution of the last.

Numerical methods, the applied physics, finite difference method (FDM), finite element method (FEM), Discrete element method (DEM).