CONSIDERATIONS ON STRUCTURE OWN OSCLLATIONS OF RESISTANCE OF THE SEPARATOR

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Abstract: In the study of dynamic aspects in the functioning of separator oscillating friction tape was used to using finite element method, applied for structure of green pea thresher. [1]
A model with a finite number of elements has a finite number of their frequency and their number equals the number of degrees of freedom model.

1. GENERAL CONSIDERATIONS

For dynamic analysis separating machine has a series of theoretical and practical methods for tracking and measuring the functioning of its parameters. Experimental methods aimed either measurement dynamic parameters during the process (online) or determine the results after stopping operation (offline).
Although modern systems (systems equipped with sensors, analogue to digital converters, and calculator), have ample opportunities to measure, they can not cover the entire range of parameters required assessment process. As an example I can remember measuring vibration transducers in some points where the location of the structure is possible but very difficult: placing transducers lane dividers or its. In tambour such cases building a model and simulation process carried out with this model we can provide data that we can obtain experimentally.[1]

2. GETTING ON THE APPLICATION OF FINITE ELEMENT METHOD

Finite Element Meshing is a process by which the system of equations of elasticity theory, with an infinite number of degrees of freedom can be transformed into a finite system of equations approximate. This transformation is done by discretization, using a fictitious network, examined the body.[3]
Resulting finite element is considered only linked network nodes and generalized movements that occur at these points of the body are the degrees of freedom of the problem and as such unknowns finished system.[4]
With this physical approximation provides a quantitative change of the problem, analyze complex body reducing the study of structure components derived from its mesh. Items are all continuous bodies, but having a simple form that can be easily broach based on laws regarding the distribution of conventional travel. Meshing operation is flexible and can be adapted for broader demands. It is possible to vary the degree of accuracy of results, choosing the appropriate size of elements. Since they are smaller and hence more nodes density, the gain is a more realistic modeling, the status of efforts and distortions. A finer mesh is important but the disadvantage of increasing the volume of data to be stored by the computer system, of time running the programs. Therefore it is appropriate to the distribution nodes with degrees higher density areas and focus efforts where lower density and distribution efforts deformations vary slowly.[5]
If a flat structure, divided into triangles, each node has two degrees of freedom (nodal displacements) such that each triangular finite element has three degrees of freedom
Algebraic equations system sizes which leads to finite element assembly operation depends not only on the size of finite element stiffness matrix components but also the

number and method of numbering the nodes of the network. In problem formulation, aims to achieve a minimum difference between the numbers of two neighboring nodes.
If it is found that a correct numbering system of equations has a band structure. This is one of the most important features of the finite element method and it underlies the process of solving the system of equations and its condensation algorithm. This leads to a square matrix, a rectangular array, the main factors occupy the first column and other columns contain zero secondary factors. That for a given structure, the bandwidth can vary very broad limits, in order of choice for numbering nodes.[2]

Figure 6.1. the manner in meshing and scoring a rectangular area plan.

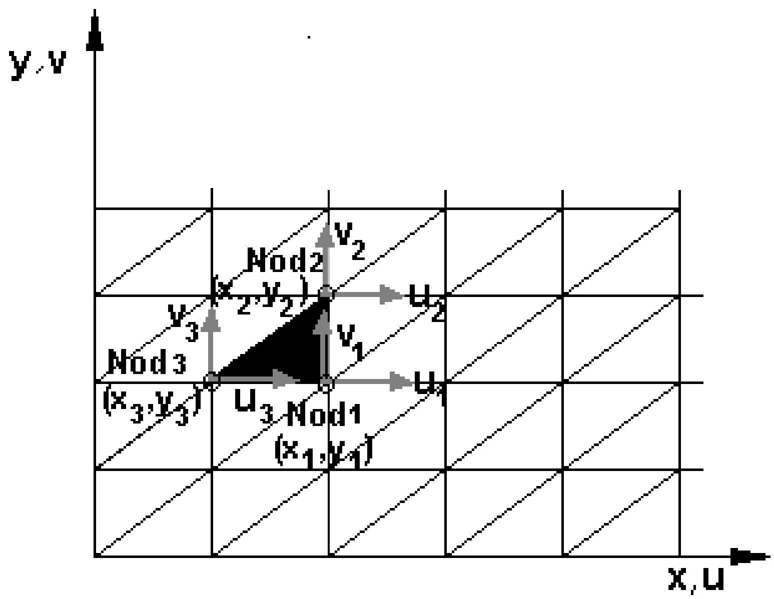

Fig.6.1. Discretization into triangular elements

There is interest in choosing a sequence, leading to a condensed grouping as secondary non-zero coefficients around the diagonal, achieving a minimum width of the tape and therefore the minimum required data storage space in computer system memory. Based on these considerations, is the discretization concrete a portion of a field level of analysis.
Triangular elements can approximate the best areas near a body of variable shape. Triangle with three nodes in the corners corresponds in terms of displacements (q) field approximation to a point P inside the element s development linear polynomial (order I) is expressed as an explicit relationship :

$$u_s(x,y) = \alpha_1 + \alpha_2 x_p + \alpha_3 y_p$$
$$v_s(x,y) = \beta_1 + \beta_2 x_p + \beta_3 y_p \qquad (6.1)$$

Using edge conditions offered by the three nodes, we can write:

$$u_{is} = \alpha_1 + \alpha_2 x_{is} + \alpha_3 y_{is}$$

$$v_{is} = \beta_1 + \beta_2 x_{is} + \beta_3 y_{is} \qquad (6.2)$$

Where: i = 1,2,3 and s = 1 ... N, N representing the number of elements of structure. System of equations is obtained as necessary to determine the unknown. Noting sides triangular projections on coordinate axes (Fig. 6.2) with:

$$y_{2s} - y_{3s} = a'_s\,,\; y_{3s} - y_{1s} = b'_s\,,\; y_{1s} - y_{2s} = c'_s$$
$$x_{3s} - x_{2s} = d'_s\,,\; x_{1s} - x_{3s} = e'_s\,,\; x_{2s} - x_{1s} = f'_s \qquad (6.3)$$

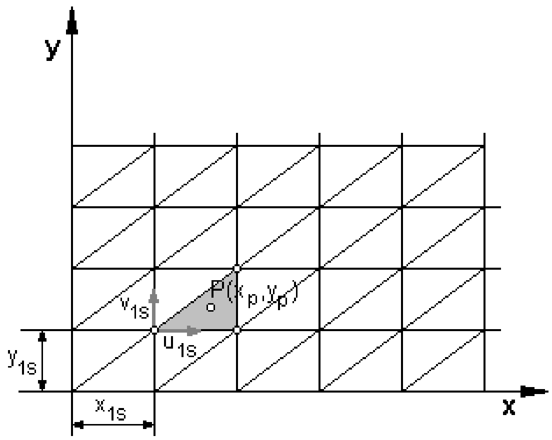

Fig. 6.2. Travel knots

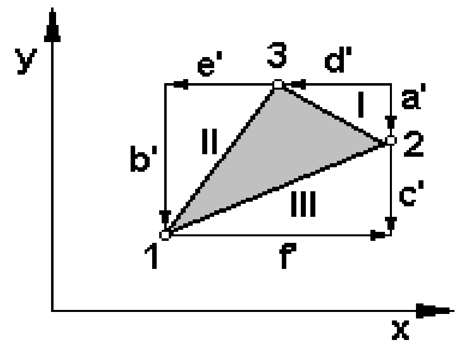

Fig. 6.3 Projections triangle sides the coordinate axes

and with:

$$g'_s = x_{2s}y_{3s} - x_{3s}y_{2s}\,,\; h'_s = x_{3s}y_{1s} - x_{1s}y_{3s}\,,\; k'_s = x_{1s}y_{2s} - x_{2s}y_{1s} \qquad (6.4)$$

and also with the triangle area:

$$\Delta s = \frac{1}{2}\cdot\begin{vmatrix} 1 & x_{1s} & y_{1s} \\ 1 & x_{2s} & y_{2s} \\ 1 & x_{3s} & y_{3s} \end{vmatrix} \qquad (6.5)$$

obtain:

$$\{q(x,y)\}^s = \begin{Bmatrix} u(x,y) \\ v(x,y) \end{Bmatrix}^s = [N]^s\{\delta\}^s = [IN_1\; IN_2\; IN_3]^s \cdot \{\delta\}^s \qquad (6.6)$$

where [I] is unit matrix $\equiv \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, and interpolation functions have the expressions:

$$N_1 = \frac{1}{2\Delta s}\left(g' + a'x + d'y\right)$$

$$N_2 = \frac{1}{2\Delta s}\left(h'+b'x+e'y\right) \tag{6.7}$$

$$N_3 = \frac{1}{2\Delta s}\left(k'+c'x+f'y\right)$$

To simplify the calculation relationships choose a local system of coordinates, so as to cancel as many of the details of element nodes, following the prior assembly of all items automatic conversion to make the rotation axes of these systems into the overall system.

3. CONCLUSIONS

Study of machine vibration resistant structure of a separated M1 was done in order to determine their frequency and of its deformations. Were established their first five frequencies and five normal modes prevail, which are closest to the excitation frequencies.

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