БЕЛОРУССКИЙ КОНГРЕСС
ПО ТЕОРЕТИЧЕСКОЙ И ПРИКЛАДНОЙ
МЕХАНИКЕ

МЕХАНИКА — 95

BELARUS CONGRESS
ON THEORETICAL AND APPLIED
MECHANICS

MECHANICS - 95

MINISTRY OF EDUCATION OF BELARUS
ACADEMY OF SCIENCES OF BELARUS
BELARUS STATE POLYTECHNIC ACADEMY
METAL-POLYMER RESEARCH INSTITUTE OF BAS
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RESEARCH CENTER OF APLIED MECHANICS IN MACHINERY
INTERNATIONAL ACADEMY OF HIGHER EDUCATION

BELARUS CONGRESS
ON THEORETICAL AND APPLIED MECHANICS

"MECHANICS - 95"

Minsk, Belarus
(6 - 11 February 1995)
ABSTRACTS OF PAPERS

MPRI BAS, "Infotribo" Ltd.
Gomel - 1995

SPAN CONSTRUCTION VIBRATION ANALYSIS OF STRING TRANSPORT SYSTEM

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A multispan heterogeneous beam with preliminary strained elements is the main constructive element of the string transport system. The beam consists of a body of a box profile, two strained strings placed one over another and filling in material possessing elastic and dispersion properties. This research offers the system of equations describing vertical beam vibrations. The following problems are solved: i) isolated load motion along the multispan beam with a free supported cut body; ii) load stream motion along the cut body beam; iii) load stream motion along the multispan beam with a noncut body.

As the result of the solution the beam dynamic flexure is represented in the form of series. The comparative analysis of the influence of damping of material properties and interior friction in beam body on wave

damping time of various length was made. Resonance conditions were obtained and non-resonance regime arrangement possibilities on load stream motion along the cut body beam were examined. Conditions under which loads following one after another will not cause resonance span vibration were obtained. Under these conditions the maximum flexure for a load stream will have flexure order for an isolated load.

Special software is developed which let obtain beam profiles at different moments of time, certain point beam vibrations and the maximum dynamic span flexure for various initial parameters of problems. A numerical analysis of the results illustrates that under the parameter corresponding to real constructions and exploitation conditions, the maximum dynamic flexure is of 10^{-4} order of the span length.

ON STRING TRANSPORT SYSTEM (STS) DYNAMICS

A.E. Yunitsky, V.P. Savtchuk, V.A. Savenkov, O.N. Vjarvilskaya

The research offers a mathematical model of transport stream motion along the multispan way, consisting of two preliminary stretched strings situated one over another and fastened in a special way together. The strings lie on a stationary stiff support. The obtained mathematical model involves an equation of vertical vibrations of j-span, $j = 1, j_0$; equations of mass centre motion and rotation round the mass centre of i-vehicle, $i = 1, i_0$. It is shown if the quantity orders included into the equation satisfy the definite requirements which can be held by the corresponding selection of constructive parameters then it is possible to use the consecutive approximation method for the solution of the initial system. The first approximation describes the motion of a stream of inertialess loads along STS. In this approximation the dynamic span flexure is represented by the series which can be summarized giving an opportunity to demonstrate and analyses the results. On the basis of this analysis the solution of the following specific problems is given.

1. Span profiles were constructed and its maximum dynamic flexure was found during the motion of a single and coupled load with the speed of $v > a$, where $a = (T/\rho)^{1/2}$, T is summed string tension, ρ is summed linear density.

2. Span profiles were constructed and its maximum dynamic flexure was found during the motion of a single load with the speed of $a/2 < v < a$.

3. Span vibrations were investigated during the motion of a stream of single and coupled loads along it; motion regimes were revealed leading to a resonance swing of the span and the regimes at which the vibrations of the span disappear because of the mutual extinction of the deformation waves.

4. A single load trajectory was defined and the maximum span flexure under the load was found.