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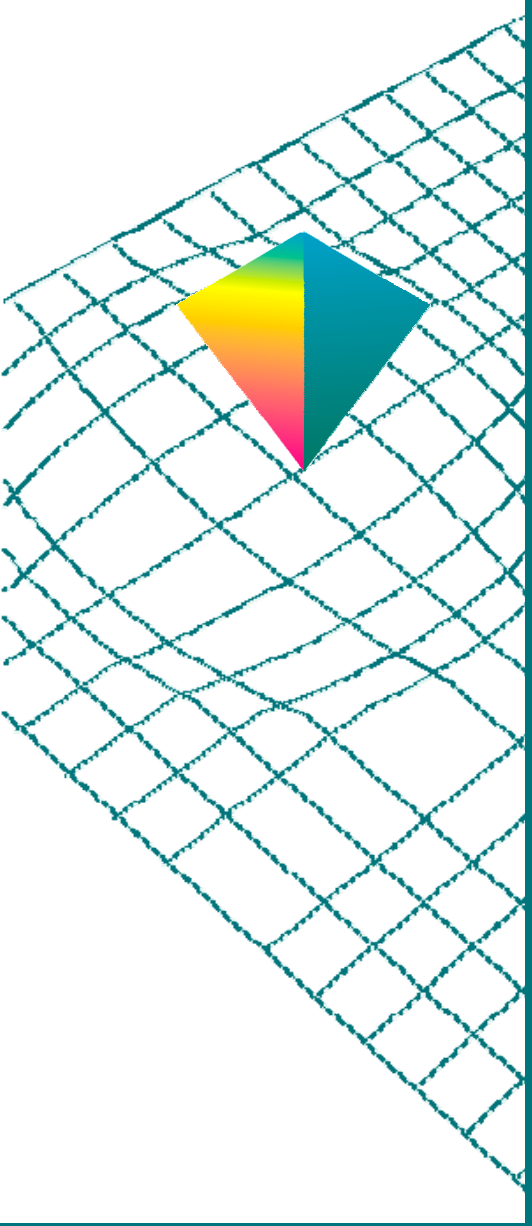

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50. Internationales Wissenschaftliches Kolloquium
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Interactive Visualization of Linear Dynamic Systems with Constant Parameters

ABSTRACT

The structure of interactive multimedia pages for web-based training was considered. Approach for the developing of multimedia interactive course "Mechanics" section "Dynamics" was described and principle of visualization of linear dynamic systems was developed.

1. INTRODUCTION

The actual problem for education institutions (especially for technical universities) is the organizing of studying process, which allows to get the education (or second education) or to get the another profession, or simply to get knowledge from a field of science.

This problem can be solved by using of personal computers and networks (for example, Internet) and computer text-books and school-books.

2. THE INTERACTIVE VISUALIZATION OF LINEAR DYNAMIC SYSTEMS

The course of laboratory and research works in the field of mechanics can be based on the interactive multimedia pages. The Laboratory of Mathematical Modeling of Technical Systems has developed the set of pages for course "Mechanics" [1] section "Oscillations", "Dynamics" and other, using the program Macromedia Flash.

All pages are built on the differential equations and real-time multimedia visualization. It is presumed that parameters within the visualization are constant. The interactivity means that the student can see the state of the dynamic system, and he can stop the process and change the parameters and initial conditions. Then he can observe the new dynamic process.

3. STRUCTURE OF INTERACTIVE MULTIMEDIA PAGE

The interactive multimedia page for the studying of Linear Dynamic Systems (course "Mechanics") consists of mechanical components (loadings, bearings, blocks, springs etc.) and information elements (texts, rulers, indicator boards, graphs and diagrams).

The page structure includes menu of components, which allows to build the mechanical system

interactively. The page developed is shown on Fig.1.

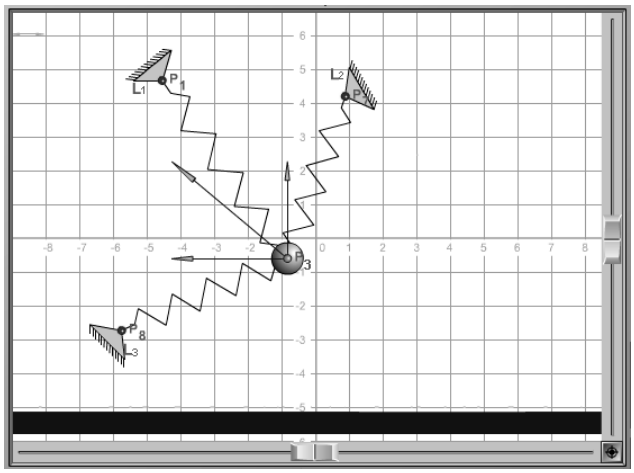

Fig.1 – Fragment of interactive page with dynamic system

To create the linear dynamic system, it is enough to drag the component into the workplace and connect it with other components. Student can set the parameters of system in the special panel or can simply to stretch the spring, to move the bearing, to connect the mass etc.

The special checkboxes, buttons and radiobuttons help to switch the visualization parameters, for example, turn on or off the vectors of force, velocity or acceleration, to show the trajectory graph or numeric values. All changes will occur in real time.

4. CONCLUSION

The actual problem of the organizing of studying process in educational institutions is described and the Interactive Multimedia Teaching System is suggested for solving of it.

The representation principles of learning course "Dynamics" and example are presented.

References:

[1] Dainiak I., Karpovich S., Ahranovich A. Multimedia Interactive Representation of Course "Mechanics" // Scientific Proceedings. – Vol.2. – Aachen: Shaker Verlag, 2004. – p.511-515

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