Professionally oriented multivariate tasks in the course of Theoretical Mechanics for technical universities

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Contemporary reality put before the system of higher professional education the problem of providing regions with qualified engineers who can independently master professional kinds of activity and have multidisciplinary systems thinking. Future engineers are trained in the process of studying natural science and disciplines of the general professional cycle, including theoretical mechanics. There are some difficulties in teaching it in a modern university: this discipline is quite difficult for the first-year students to perceive; a sharp reduction in the number of class hours causes the need to optimize the learning process, even in full-time education. This calls for the creation of effective interactive distance learning tools (IDLT) aimed at organizing independent work of students. In most of the existing IDLT in theoretical mechanics some or all of the following issues are missing: adaptation of the material to specified criteria to ensure the required level of complexity and scope of study; the development and implementation of fundamentally new design tasks, oriented not only to the formation of basic theoretical knowledge, but also to the acquisition of skills in solving problems closely related to future professional activity. Using specialized mathematical packages in the study of theoretical mechanics, as well as the orientation of the delivered material on the future professional activity of students and the strengthening interdisciplinary connections of disciplines of a mechanical profile are the distinctive characteristics of the developed IDLT, presented in the article. We developed a methodology for calculating the static and strength parameters of mechanical systems (solids, composite structures, trusses) in the Maple and MathCAD systems. A software package used as a generator of unique multivariable computed professionally-oriented tasks, ranked by the degree of complexity is created. Some ideas of the proposed methodology can be found in research works of Russian scientists, but at present there is no analogue capable of solving educational and scientific-practical problems, generating tasks of a given complexity with automatic verification the results obtained, forming a bank for unique multi-choice professionally-oriented computational tasks, implementing the IDLT in full.

Keywords: *theory of mechanics, interactive learning tools, computer simulation, generator of problems, professionally-oriented multivariable tasks*

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