Igor Ososkov

L. Neduzha, Scientific adviser

K. Panteleyenko, Language consultant

Dniepropetrovsk National University of Railway Transport

named after Academician V. Lazaryan

An Application of Programming Complex for the Calculation of Constructions and Mechanisms

The systems of computer-aided design are very important in the modern conditions. Primarily, the purpose and the task of them are to increase the efficiency of engineer work and to achieve the highest quality and technical-economic level of the designing results. A programming complex assigns a user the wide range of possibilities for creating models of three-dimensional arbitrary constructions, consisting of cored, shell modeled and solid-stated elements. For the necessity of the shell modeled and solid-stated construction types it is possible to import from any sided three-dimensional graphics editors, using the standard exchange format.

By means of corresponding programming instruments it is possible to conduct statically, deformational and nonlinear calculations, to analyze the stability of constructions, to calculate own frequencies and forms, and also to analyze the behavior of the system at external variable influence (to calculate removements, deformations, tensions). An additional special facilities assign to perform calculation of temperature field distribution of the temperature field and to estimate tensions of temperature and deformations in operation of device in different from nominal temperature terms, and also, besides the stable analysis of the construction models it maybe to conduct the calculation of the weld-fabricated, group screw-bolt and riveting connections, and also connections of details bodies of rotation types.

After the cycle of calculations the automatic generation of drafts of both separate elements and frame-clamping draft is performed on the whole. On the results of calculations numerous charts are built among that are: the distribution of equivalent tensions and their constituents, linear, angular and total movements, deformations on the elements of construction, map of distribution and epures of internal efforts, the efforts in a pin zone, the coefficient of stability supply and form loss of stability, the coefficient of stability margin and form of instability, the coefficient of margin and number of cycles on the criterion of tireless durability, the coefficient of margin on the criteria of fluidity and durability of temperature fields. Promoting their efficiency is possible due to correct organization of series of calculations with the purpose of receipt of the best result, therefore application of method of eventual elements is more widely widespread at the decision of tasks of mechanics of the deformed solid, heat exchange, hydrodynamics and electrodynamics. A programming complex allows deciding the tasks calculation of power calculations and kinematics parameters; the durability, inflexibility and stability; the endurance at the variable modes of loading, reliability and wearproofness, and also dynamic descriptions, for the constructions of machines, mechanisms and their elements.