

BUILDING COMPETENCE IN MATHEMATICAL MODELING THROUGH INVERSE PROBLEMS FOR DIFFERENTIAL EQUATIONS

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Annotation. In article the problem of training of specialists in the field of applied mathematics is discussed. The attention on the content of training of students of technical specialties of higher educational institutions to the inverse problems for differential equations is paid. Conclusions about formation of competence of students in the field of applied mathematics in the course of such training are drawn.

To draw up a mathematical model in the form of differential equations, as a rule, you need to know only local connections and do not need information about the entire physical phenomenon as a whole. The differential equation as a mathematical model makes it possible to study the phenomenon as a whole, predict its development, make quantitative estimates of the changes occurring in it over time.

A certain contribution to the formation of competence in the field of differential equations among students of technical specialties of higher educational institutions is made by teaching inverse problems for differential equations.

In the process of teaching inverse problems for differential equations, students are encouraged to explore various applied problems, including wave processes of propagation of electromagnetic waves in the atmosphere, ionosphere, terrestrial or aquatic environments. In the process of such training, students master not only the methods of studying inverse problems, but also replenish their knowledge about wave processes as one of the forms of motion of matter, studied in the course of physics-electrodynamics, hydrodynamics, acoustics, optics, etc. Solving various inverse problems for wave equations, students form knowledge about wave processes as about complex models of motion of real systems, the state of which depends on both spatial variables and time. The examples considered in the classroom for students clearly demonstrate the implementation of an applied orientation, inter-subject relations in the process of teaching inverse problems for differential equations, which contribute to the formation of students' fundamental knowledge in various disciplines of natural science. In the process of solving this inverse problem, students realize the correctness of the mathematical model of the inverse problem, analyze problem situations in the implementation of the mathematical method for solving the inverse problem, apply the knowledge gained to solve a specific applied problem, discover knowledge in the field of theory and practice of studying mathematical models, correctly explain and substantiate practical conclusions of the obtained solution of the inverse problem. Obviously, in this case, students demonstrate competence in applied mathematics.

References

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