NUMERICAL SOLUTION OF NONLINEAR INTEGRO-DIFFERENTIAL EQUATIONS WITH HEREDITY SINGULAR KERNELS

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The basis for the numerical solution of linear and nonlinear integro-differential equations (IDE) such as Volterra are well developed numerical methods. Various methods are used for the IDE solutions. For example, the method of integral type and integral transforms, Runge-Kutta, averaging, freezing, and others.

In [1-4] proposed an effective approach to the numerical solution of systems of linear and nonlinear IDE with slightly singular kernels heredity. This method is based on the joint rational use of various analytical transformations, allowing to reduce the original system to a system of integral equations with regular nuclei and stable numerical integration, provides solutions to the problems of a high degree of accuracy.

Further, based on this approach will solve the problem of some nonlinear applications hereditary-deformable systems.

In this paper, based on integrated models, mathematical models of nonlinear dynamic problems of the pipeline, with the flowing gas liquids. These nonlinear partial IDE using the Bubnov-Galerkin method for the considered boundary conditions are reduced to solving systems of nonlinear ordinary IDE with constant or variable coefficients with respect to a function of time. To study the processes of vibrational pipelines proposed numerical algorithm for solving nonlinear integral-differential equations with singular kernels. On the basis of the developed computational algorithm created complex applications. Numerically investigated the influence of a singularity in the nuclei of heredity on designs fluctuations having viscoelastic properties.

References

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