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ABSTRACTS

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can be described in such a way. In addition, this geometry ... simple input and mesh data structures.

The following technology aspects of the solving process are described: approximation, data structures, solver.

The mesh used is piecewise constant. The problem is discretized with $O(h^2)$ or $O(h^4)$ integro-balance approximations. This leads to an element or a sort of 'quasi-element' balance matrix assembling which is similar to the finite-element method's assembling. The solver used is incomplete factorization method with acceleration by conjugate gradients.

Numerical results for model and real problems are presented.

Algebraic Multigrid Preconditioning for Finite Element Matrices on Triangular Grids

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The paper is devoted to constructing multilevel preconditioners for symmetric, positive definite matrices which arise approximating elliptic problems by finite element methods. The main idea of the approach proposed consists in partitioning the set of the sides of the grid cells into substructures and using inner Chebyshev iterative procedures. The proconditioner constructed may be considered to belong to the class ofoptimal preconditioners, since it is spectrally equivalent to the original stiffness matrix and the upper bound for its arithmatic cost is cN, where c is a positive constant independent of the grid step size and N is the dimension of grid problem.

The Use of Defect Correction for the Solution of Parabolic Singular Perturbation Problems

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The Dirichlet problem for a singularly perturbed parabolic equation is studied. The space domain is a finite interval and a small parameter ε multiplies the space derivatives. Thus, for a vanishing ε only a derivative

with respect to the time-variable remains. For small values of ε boundary layers may appear near the lateral boundary of the space-time domain.

It is known that a classical difference schemes do not converge ε-uniformly, and for a special ε-uniform scheme the order of convergence with respect to the time-step is not larger than one.

For the solution of the boundary value problem new special difference schemes, on a condensing grid, are constructed to obtain ε-uniform convergence. In addition, discrete solutions are constructed that have an increased order of approximation with respect to the time variable, by using defect correction.

By this defect correction technique we obtain the higher order approximations, as well as auxiliary intermediate schemes, all on the same time-grid.

Illustrative numerical results are presented.

Modelling Impact Problems in Nuclear Power Plants Using Maple

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The global safety of nuclear power plant also depends on the resistance of internal and external plate and shell-type concrete structures to penetration and prforation caused by accidentally generated flying objects, such as parts of failed rotator equipment's, ruptured piping, tornado missiles or impacting aircraft engines. In practice, the structural verification is usually carried out by means of empirical formulas, which relate to the velocity of impinging missile to the wall thickness needed for prevent back-face scabbing or perforation, see [1, 2, 3]. Typically avilable equations incorporate the missile mass, as well as its effective diameter representing the size of the contact area, as governing projectile parameters.

In the paper we attempt to analyse equations for calculating on some physical bases the penetration of solid projectiles into concrete tergets by the modern computational tool – Maple V. These results are needed to carify the influence of the strength and of the length to diameter ration of the projectile. The basic features of the penetration process in concrete structures hit by solid missiles are discussed. An equation for penetration depth of ogive-nose projectiles penetrating concrete targets at normal impact is analysed by Maple [4, 5, 6, 7] symbolic mathematical computational tool. A comparison with aviable experimental data are also conducted. The paper brings some results of the project "Modelling probable accidents of nuclear pwer plants" solved on the Czech university supercomputer network in Brno.