

C O N T E N T S

Krätzschar, M.: Inverse-isotone mappings, M-matrices, M-functions and their application to nonlinear block-Gauss-Seidel iterations	9
1. Introduction and notations	9
2. Inverse-isotone mappings, M-matrices, M-functions and their basic properties	10
3. Block-M-functions and the convergence of nonlinear block-Gauss-Seidel and block-Jacobi iterations	15
Krätzschar, M.: Inverse-positive type discretization of the Laplace operator and monotone methods for solving mildly nonlinear elliptic partial differential equations	19
1. Mildly nonlinear PDE	19
2. Finite-difference equations and convergence as $h \rightarrow 0$	20
3. Monotone enclosure for solving mildly nonlinear elliptic PDE and difference equations	26
Vanselow, R.: Monotonicity preserving properties of the method of lines for parabolic equations	37
1. Introduction	37
2. The parabolic differential equation and stability properties	37
3. Foundations of the studies of nonlinear stability for differential equations	39
4. The method of lines	41
5. Stability statements	43
6. Application	50
Schnerr, F.; Scholz, S.; Vanselow, R.: Error bounds for characteristic initial value problems of hyperbolic differential equations	53
1. Introduction	53
2. The inclusion theorem of Schröder	54
3. Theorems on error bounds for the problem (1.3)	55
4. Application of the inclusion theorem for error estimation	63
5. Numerical examples	69
6. Appendix	76
Reitmann, V.: Two-sided bounds and norm bounds for the solutions of semilinear ordinary differential equations	83
Scholz, S.: Modified Rosenbrock methods with built-in global error estimation and time-lagged Jacobian	94
1. Introduction	94
2. On the existence of mRm 's with global error estimation	95
3. mRm 's of 2nd and 3rd order with built-in global error estimation	100
Seifert, P.: Some experiences in computer codes for stiff and large-scale ordinary differential equations	105
1. Stiff differential equations	105
2. Methods and codes for stiff systems	106
3. Numerical tests with various examples	109
4. Computational experiments with randomly generated examples	112
5. Modifications of the codes for large-scale ODEs	117

Elschner, H.; Klix, W.; Spallek, R.: Numerical simulation of semiconductor devices	123
1. Introduction	123
2. Device simulation by solving semiconductor equations	125
3. Simulation of the doping profile by solving diffusion equations	150
4. Thermal simulation by solving diffusion equations	153
5. Summary	158
Großmann, Ch.: Mixed finite element methods and penalties for weakly nonlinear partial differential equations	162
1. Mixed FEM for linear problems	162
2. Nonlinear variational inequalities and a priori estimations	164
3. Mixed variational formulation and penalties	169
4. Determination of the growth function $\mu(\cdot)$	176
5. A numerical realization for obstacle problems	177
Pfeifer, E.: On the Green function for a finite difference approximation of a two-dimensional Dirichlet problem	182
1. Introduction	182
2. The Green function for the operator $\partial_x \bar{\partial}_x + \lambda$, $\lambda > 0$, with homogeneous Dirichlet conditions	183
3. The Green function for $\Delta^{(h)}$ with homogeneous Dirichlet conditions	188
4. Nonhomogeneous Dirichlet conditions	191
Riedrich, Th.: Functional analytic aspects of the R. Iglish continuation process for the Dirichlet problem $\Delta u = F(u, x)$ with $\frac{\partial F(u, x)}{\partial u} \geq 0$	193
1. Preliminaries	193
2. Assumptions on $F(u, x)$	195
3. A priori estimates for the nonlinear boundary value problem $(\Delta u)(x) = F(u(x), x) + (\Delta v)(x); u _{\Gamma} = v _{\Gamma}$	196
4. The nonlinear integral operator \hat{G}	198
5. The completely continuous vector field $A = Id + \hat{G}$	199