ÜBUNGEN ZU

NUMERIK PARTIELLER DIFFERENTIALGLEICHUNGEN

für den 11. 1. 2006

Send your programs to `zulehner@numa.uni-linz.ac.at` by 9 a.m.

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42. Use your functions to discretize the following one-dimensional boundary value problem

    Find a function $u(x)$ such that

$$\begin{aligned} -u''(x) &= f(x) \quad x \in \Omega, \\ u(x) &= g_D(x) \quad x \in \Gamma_D, \\ \frac{\partial u}{\partial n}(x) &= g_N(x) \quad x \in \Gamma_N, \end{aligned}$$

    with the data

$$f(x) = 8,\ \Omega = (0,1),\ \Gamma_D = \{0\},\ g_D(x) = -1,\ \Gamma_N = \{1\},\ g_N(x) = -4.$$

    Then solve the discretized problem

$$K_h \underline{u}_h = \underline{f}_h$$

    by the preconditioned gradient method and preconditioned conjugate gradient method with MDS preconditioner.

    (a) How does the number of iterations n depend on the step size h and on the number of N_h of unknowns, respectively?

    (b) How does the cpu time t depend on the step size h and on the number of N_h of unknowns, respectively?