Sparse Matrix Techniques in Scientific Computing

Aurelian Nicola, Constantin Popa

Ovidius University, Blvd. Mamaia 124, 900527 Constanta, Romania

{anicola, cpopa}@univ-ovidius.ro

Abstract. Although the most important and relevant part of the scientific activity of Dr. Neculai Andrei is related to the design of efficient algorithms and software products for optimization problems, his first book, written in 1983 was devoted to sparse matrices and some of their applications in scientific computing. This is why we decided to present in our contribution some developments that we made in this direction, in the context of Matlab software, and 25 years after Neculai Andrei's book. The paper presents the design and efficient implementation of some sparse matrix codes for numerical solution of a 2D convection-diffusion-reaction problem, by a preconditioned CG algorithm.

Keywords: sparse matrices, scientific computing, convection-diffusion-reaction problems, multigrid algorithms, preconditioned CG algorithm