Contribution ID: **225**   Type: **not specified**

Effective Methods for Solving Band SLE after Parabolic Nonlinear PDEs.

Monday, 3 July 2017 17:00 (30 minutes)

A class of models of heat transfer processes in a multilayer domain was considered. The governing equation (GE) is a nonlinear heat-transfer equation with different temperature-dependent densities and thermal coefficients in each layer. Homogeneous Neumann boundary conditions and ideal contact ones were applied. The aim of this research was to build a finite difference scheme on an uneven mesh with a second-order approximation in some norm in the case of a piecewise constant spatial step. This discretization leads to a pentadiagonal (PD) system of linear equations with a matrix which is neither diagonally dominant, nor positive definite. A tridiagonal (TD) system was obtained, using Gaussian elimination. Two different methods for solving the two linear systems were developed –diagonal dominantization and symbolic algorithms.

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Session Classification: Poster Session