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ON THE TWO-LAYER EXPLICIT DIFFERENCE SCHEME FOR THE NONLINEAR TWO-DIMENSIONAL PSEUDO-PARABOLIC EQUATION WITH NONLOCAL BOUNDARY CONDITIONS

JUSTINA JACHIMAVIČIENĖ[1] and MIFODIJUS SAPAGOVAS[2,*]

[1] *Vytautas Magnus University*
Vileikos str. 8, LT-44404 Kaunas, Lithuania
[2] *Institute of Mathematics and Informatics, Vilnius University*
Akademijos str. 4, LT-08663 Vilnius, Lithuania
E-mail: justina_jachimaviciene@yahoo.com, mifodijus.sapagovas@mii.vu.lt

We consider the third order nonlinear two-dimensional pseudoparabolic equation with integral conditions:

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \eta \frac{\partial}{\partial t}\Big(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\Big) + f(x,y,t,u),$$
$$u(0,y,t) = \gamma_1 \int_0^1 u(x,y,t)\mathrm{d}x + \mu_1(y,t), \quad u(1,y,t) = \gamma_2 \int_0^1 u(x,y,t)\mathrm{d}x + \mu_2(y,t),$$
$$u(x,0,t) = \mu_3(x,t), \quad u(x,1,t) = \mu_4(x,t), \quad u(x,y,0) = \varphi(x,y),$$

where $\eta \geq 0$, $\partial f/\partial u \leq 0$.

Note, that in the case $\eta \neq 0$, we can not write an explicit two-layer finite difference scheme for this problem. So, we must to use other two-layer implicit schemes [1] or three-layer explicit schemes with a very special approximation of third order derivative [2].

In this talk we analyze two possibilities to write two-layer explicit difference schemes. The key for justifying such an approach lies in the combination of implicit two-layer schemes with some iterative processes. Some numerical results are presented as well.

REFERENCES

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