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SPECIAL SPLINES OF HYPERBOLIC TYPE FOR THE SOLUTIONS OF HEAT AND MASS TRANSFER 3-D PROBLEMS IN POROUS MULTI-LAYERED AXIAL SYMMETRY DOMAIN [1]

HARIJS KALIS[2], ANDRIS BUIKIS[2], AIVARS ABOLTINS[3] and ILMARS KANGRO[4]

[2] *Institute of Mathematics and Computer Science of University of Latvia*

Raina bulvāris 29, Rīga LV-1459, Latvija

[3] *Latvia University of Agriculture, Faculty of Engineering*

5 J. Cakstes blvd., Jelgava, LV-3001

[4] *Rēzekne Academy of Technologie, Faculty of Engineering*

Atbrīvoŝanas aleja 115,LV-4601, Rēzekne, Latvija

E-mail: kalis@lanet.lv, aivars.aboltins@llu.lu, kangro@ru.lv

We study the heat and moisture transfer processes in the porous multilayered media layer. In one layer this process is analaysed and decribed in [1, 2].

The process of diffusion is consider in 3-D domain

$$\Omega = \{(r, z, \phi) : 0 \le r \le R, 0 \le z \le L, 0 \le \phi \le 2\pi\}.$$

The domain Ω consists of multilayer medium in the r direction. We will consider the non-stationary axis-symmetrical problem of the linear diffusion theory for multilayered piece-wise homogenous materials of N layers in the subdomain $\Omega_i = \{(r, z, \phi) : r \in (r_{i-1}, r_i), z \in (0, L), \phi \in (0, 2\pi)\}, i = \overline{1, N}$, where $H_i = r_i - r_{i-1}$ is the height of layer $\Omega_i, r_0 = 0, r_N = R$.

We shall further assume linear dependence on both temperature and moisture content in every layer [2] $M_i = const + \sigma_i C_i - \omega_i T_i$, where $T_i(r, z, t), C_i(r, z, t)$ are the temperature and concentration of water vapour in the air spaces, M_i is the amount of moisture absorbed by unit mass of fibre, σ_i and ω_i are constants. We can derive two equations, one expressing the rate of change of concentration and the other the rate of change of temperature.

The approximation of corresponding initial boundary value problem of the system of PDEs is based on the conservative averaging method(CAM), where the new hyperbolic type integral splines are used. For these splines the best parameter for minimal error is calculated.

The 3D axial symmetrical problem of the system of PDEs with piece-wise constant coefficients are approximated on the initial value problem of a system of ODEs of the first order. It is possible to modelling round and angular wood-blocks and gives some new physical conclusions about the drying and moister processes in these blocks.

REFERENCES

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