On efficient difference schemes for modelling a moisture movement in wood

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We propose and analyze a class of finite difference schemes for solving a system of nonlinear advection-diffusion-reaction equations

$$\begin{aligned} \frac{\partial c}{\partial t} + \mu \frac{\partial c}{\partial x} &= \frac{\partial}{\partial x}\left(D(c) \frac{\partial c}{\partial x} \right) - \frac{\partial s}{\partial t}, \\ \frac{\partial s}{\partial t} &= lc - ks, \end{aligned}$$

with the third type boundary conditions imposed at $x = 0$ and $x = L$, and with initial data imposed at $t = 0$. The problem describes the moisture movement in wood, and c denotes the moisture mass concentration in the wood cavities and s denotes the sorbed cell-wall mass concentration. Here we take into account the advection and diffusion of the water.

References

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