

Title: Numerical study for the parameter estimation of the moisture transfer

Authors: Lee, Yong Hun & Park, Yeon Hee

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Review by: Mario Forcinito

A common problem in the mathematical modeling of mass and heat transfer is that the field equations, usually a variation of the Fick's law, need to be solved together with boundary conditions that are dependent on the gradients close to the boundary and on other exterior processes with different governing laws. These exterior processes are often modeled in terms of transfer coefficients that are very difficult (or impossible) to measure with available experimental techniques. Such is the case of the thermal behavior of wood exposed to the outdoors, which is influenced by solar absorptivity and long-wave emissivity, quantities that are difficult to measure that properties directly.

Using temperature data from field experiments, the authors use the least-square optimization technique to find the values of the parameters that better match the numerical solution of the problem. The computational temperatures were obtained using the control volume finite element method(CVFEM). Gauss-Newton iteration was used to achieve the optimal values although convergence and error estimation remained to be analyzed in future work.