

## ABSTRACT

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### **A Hybrid Multi-Objective Optimisation Approach to Identification of Mechanical and Moisture Transfer Parameters associated with Timber Drying**

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Timber drying is the first step in wood processing industries, in which excessive moisture is removed up to an acceptable level required when manufacturing wooden components or structures. Numerical simulation of such processes makes possible to define proper drying schedules and product finish able to reduce potential defects.

Numerical simulation of drying processes requires solution of the momentum, heat and mass transfer governing equations associated with respective material constitutive relations [1]. The latter establishes the physical laws for shrinking/swelling, temperature and moisture content evolutions, which in turn are associated with corresponding material and processing parameters.

The present work is inserted within this framework, in which a hybrid multi-objective optimisation technique [2] is developed to determine the mechanical and mass transfer parameters based on control drying of wooden samples. The multi-objective scheme is based on a global approach, i.e. the material parameters are determined taking into account multiple samples simultaneously. A global-local hybrid optimisation approach is also adopted in order to handle possible non-convexities of the optimisation problem [3].

[1] K. Holek, P.S.B Zdanski, M. Vaz Jr., J. Braz. Soc. Mech. Sci. Eng., 43,11 (2021)

[2] M. Vaz Jr., Mech. Adv. Mater. Struct., 30, 4065 (2023).

[3] M. Vaz Jr., P.S.B Zdanski, Disc. Mech. Eng., 3,8 (2024).