Editorial

Modeling the Performance of Wood and Wood Products

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Wood is an advantageous building material with respect to its material properties, its renewable character, its sustainable production, and its ability to store sequestered carbon. However, wood can burn, rot, and turn ugly when it is used in an inappropriate way. This is not a severe drawback as such, but the processes behind it are often more difficult to predict compared to other materials, such as steel, concrete, or polymers. Hence, substantial efforts are needed to make the performance of wood and wood products more predictable and thus make wood a more competitive building material. In particular, the response of wood to moisture, wood-inhabiting organisms, and fire are of immanent importance for a multitude of applications in the building sector. Mathematical models, survey-based prediction tools, simulation software, and risk mapping can be used to characterize wood and its capacity to withstand external influences in a quantitative way. These are essential instruments for service life planning and the performance classification of wood and wooden products.

In recent years, enormous efforts have been made to improve the methodology and to enlarge the pool of data needed for service planning with wood. Numerous research groups around the globe followed a variety of strategies and used different concepts, but they all approached the overall objective to make wood more predictable. Within this Special Issue, we collected contributions from all disciplines, such as wood material science, building physics, timber engineering, wood pathology, and climatology.

We encouraged studies from all fields, including decay hazard mapping, hygrothermal simulation, moisture performance modeling, performance classification, service life prediction, and service life planning to contribute to this Special Issue, to promote knowledge about the performance of wood under different uses and changing climatic conditions.

The Special Issue comprises 12 papers by authors from 17 countries in Australasia, Africa, North America, and Europe. They represent a wide range of aspects related to performance modeling of wood and wood products and give timely examples of research activities that can be observed around the globe. Several authors reported on engineering approaches to predict and plan the service lives of buildings and structures made of wood [1–3], models focusing on material properties such as material resistance against decay agents [3–7], basic wood properties and their distribution in trees [8], and new methods of monitoring performance-related parameters [9]. The link between exposure-induced dosage and material-inherent resistance were established for a variety of use conditions, such as soil contact and different above-ground scenarios [2–5,7,10,11]. Finally, even a model describing the performance of media presenting wood-based products is presented [12].

Conflicts of Interest: The author declares no conflict of interest.

References

1. Van Niekerk, P.; Brischke, C.; Niklewski, J. Estimating the Service Life of Timber Structures Concerning Risk and Influence of Fungal Decay—A Review of Existing Theory and Modelling Approaches. *Forests* **2021**, *12*, 588. [CrossRef]
2. Niklewski, J.; van Niekerk, P.; Brischke, C.; Hansson, E.F. Evaluation of Moisture and Decay Models for a New Design Framework for Decay Prediction of Wood. *Forests* **2021**, *12*, 721. [CrossRef]
3. Brischke, C.; Alfredsen, G.; Humar, M.; Conti, E.; Cookson, L.; Emmerich, L.; Flæte, P.; Fortino, S.; Francis, L.; Hundhausen, U.; et al. Modelling the Material Resistance of Wood—Part 3: Relative Resistance in above- and in-Ground Situations—Results of a Global Survey. *Forests* **2021**, *12*, 590. [CrossRef]
4. Alfredsen, G.; Brischke, C.; Marais, B.; Stein, R.; Zimmer, K.; Humar, M. Modelling the Material Resistance of Wood—Part 1: Utilizing Durability Test Data Based on Different Reference Wood Species. *Forests* **2021**, *12*, 558. [CrossRef]
5. Brischke, C.; Alfredsen, G.; Humar, M.; Conti, E.; Cookson, L.; Emmerich, L.; Flæte, P.; Fortino, S.; Francis, L.; Hundhausen, U.; et al. Modelling the Material Resistance of Wood—Part 2: Validation and Optimization of the Meyer-Veltrup Model. *Forests* **2021**, *12*, 576. [CrossRef]
6. Singh, T.; Page, D. Evaluation of Selected Accelerated Above-Ground Durability Testing Methods for Wood after Ten Years Exposure. *Forests* **2020**, *11*, 559. [CrossRef]
7. Emmerich, L.; Brischke, C.; Sievert, M.; Schulz, M.; Jaeger, A.; Beulshausen, A.; Humar, M. Predicting the Outdoor Moisture Performance of Wood Based on Laboratory Indicators. *Forests* **2020**, *11*, 1001. [CrossRef]
8. Jiang, J.; Li, J.; Pang, L.; Ming, A. A Comparative Evaluation of Three Stem Profile Equations for Three Precious Tree Species in Southern China. *Forests* **2020**, *11*, 669. [CrossRef]
9. García Faura, Á.; Štepec, D.; Cankar, M.; Humar, M. Application of Unsupervised Anomaly Detection Techniques to Moisture Content Data from Wood Constructions. *Forests* **2021**, *12*, 194. [CrossRef]
10. Marais, B.; Brischke, C.; Militz, H.; Peters, J.; Reinhardt, L. Studies into Fungal Decay of Wood In Ground Contact—Part 1: The Influence of Water-Holding Capacity, Moisture Content, and Temperature of Soil Substrates on Fungal Decay of Selected Timbers. *Forests* **2020**, *11*, 1284. [CrossRef]
11. Marais, B.; van Niekerk, P.; Brischke, C. Studies into Fungal Decay of Wood in Ground Contact—Part 2: Development of a Dose–Response Model to Predict Decay Rate. *Forests* **2021**, *12*, 698. [CrossRef]
12. Kropivšek, J.; Grošelj, P.; Oblak, L.; Jošt, M. A Comprehensive Evaluation Model for Wood Companies Websites Based on the AHP/R-TOPSIS Method. *Forests* **2021**, *12*, 706. [CrossRef]