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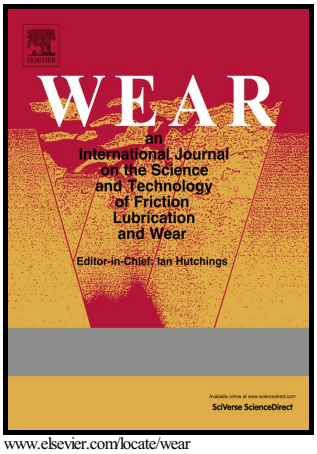

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Effects of microstructural orientation on the abrasive wear resistance of subfossil elm wood in three orthogonal planes

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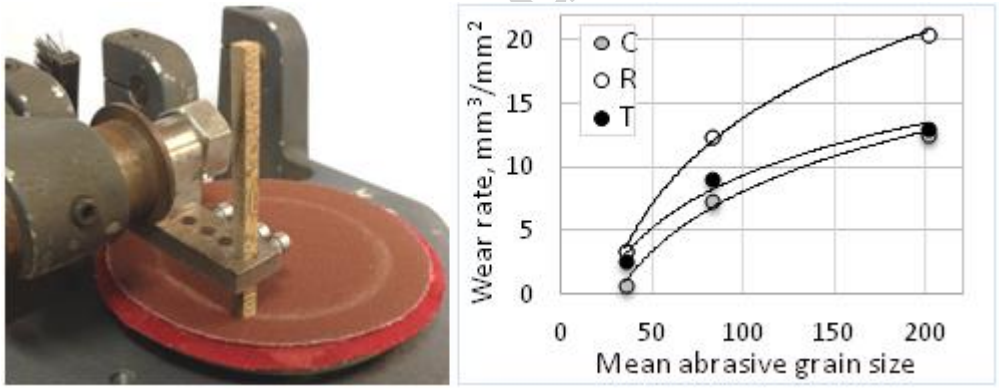
The research is part of a more extensive project in wood science, and its aim was to identify the effects of microstructural orientation on the two-body abrasive wear of sub-fossil wood. Samples to be tested were prepared from an approximately 670 year-old sub-fossil elm trunk retrieved from the Sava River bed in the northern part of Bosnia and Herzegovina. The samples were mounted to present three orthogonal planes (transverse, radial, and tangential) to a rotating disk of sandpaper. The effects of three average grit sizes (35, 82, and 201 μm) were also investigated. The rate of abrasive wear for each microstructural orientation grew linearly with the number of grinding cycles. The lowest wear rate was observed on the transverse cross-section and the highest on the radial cross-section. As the sandpaper grit size was decreased, the wear rate values decreased for all cross-sections and became similar to one another. The wear resistance appears to be less affected by the heterogeneity of the wood microstructure than it is by a decrease in diameter of the abrasive grains. It was therefore concluded that the abrasion response of subfossil elm wood exhibits the same characteristics as the hitherto researched, more recent wood samples.

Graphical abstract



Keywords: abrasive wear resistance, subfossil wood, elm, structural anisotropy

Introduction

Wood is a natural and orthotropic material having unique and independent mechanical and other properties in the direction of three mutually-orthogonal twofold axes of rotational symmetry. The three principal axes are longitudinal (parallel to fibers), radial (perpendicular to annual growth rings and to wood grain) and tangential