Behavior of Wood in Transverse Compression

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Abstract

A finite element analysis program exists to evaluate the stress distribution in wood members subjected to perpendicular-to-grain (transverse) compression. In this study, the program was used to perform parameter studies to evaluate the effects of key variables on the distribution of stresses and the maximum stress concentrations in wood subjected to transverse compression. These variables included: specimen geometry (length/depth), loading geometry (loaded length/specimen length), and material properties (ratio of moduli of elasticity of the wood in the direction of loading/perpendicular to loading). The results showed that a complex state of stress exists in members even when the load is distributed over the entire specimen surface. In particular, numerically-determined stresses nearly 3.5 times the nominal stress were found for certain combinations of input parameters. In addition, an empirically-derived equation is presented that estimates the magnitude of maximum stress concentration as a function of the three parameters investigated. The equation was developed with the use of multiple regression techniques and had a correlation coefficient of 0.958.