

CHECKING THE VALIDITY OF THE HYPOTHESIS OF SMALL DISPLACEMENTS IN THE WOODEN BEAMS OF THE GENUS EUCALYPTUS

André Luis CHRISTOFORO¹
Anderson Renato Vobornik WOLENSKI²
Túlio Hallak PANZERA¹
Paulo César Monteiro LAMIM FILHO¹
Fabiano Bianchini BATISTA¹

- **ABSTRACT:** *Wooden beams are structural elements commonly used in construction. The design of these and other structural elements requires the verification of ultimate limit state and limit state use. In general terms, the design of beams is developed starting from the premise that the structures are restricted to small displacements and the material is required within the linear elastic regime. The hypothesis of small displacements implies a simplification and, more specifically, in a linearization of the equation, nature of which is non-linear. This assumption allows to determine the function of displacement in beam through analytical procedures of differential and integral calculus. When it comes to checking the limit state use, the Brazilian standard NBR 7190-1997 predicts that the greatest value of the offset between the supports of a beam should not exceed the ratio $L/200$, where L is the length of the aperture defined between the supports, expressed in centimeters. This work aims to verify the validity of the hypothesis of small displacements in wooden beams of Eucalyptus genus. This analysis is performed with the aid of the Finite Differences Method allied to the Newton-Raphson Method.*
- **KEYWORDS:** *Wooden beams; finite differences method; Newton-Raphson method.*

¹ Universidade Federal de São João Del-Rei – UFSJ, Campus Santo Antônio, Departamento de Engenharia Mecânica, CEP: 36307-352, São João Del-Rei, MG, Brasil. E-mail: achristo@ufsj.edu.br / panzera@ufsj.edu.br / lamim@ufsj.edu.br / fabianchini@civil.cefetmg.br

² Universidade Federal de Minas Gerais – UFMG, Departamento de Engenharia de Estruturas, CEP: 31270-901, Belo Horizonte, MG, Brasil. E-mail: anderson@dees.ufmg.br