Numerical analysis of the relationships between tree structure and biomechanical functions, and application in forestry

T. Fourcaud, L. Dupuy, D. Sellier, P. Ancelin, P. Lac
LRBB, UMR CNRS, INRA, University Bordeaux I, Domaine de l’hermitage, 69 route d’Arcachon, 33612 Cestas Cedex, France

The relationship between tree structure and biomechanical functions is a key component in explaining the diversity of plant shapes, including both aerial and belowground organs. It is now well known that plants are able to adapt to recurrent, external mechanical stresses, with changes in growth and morphology, which in turn increase stability and resistance to wind loading.

This paper aims to review the recent developments that have been carried out in LRBB, France, in order to investigate tree stability. The role of structural data in both root anchorage and oscillation of the aerial parts of trees is shown. The interest of including these biomechanical factors in process based models is discussed with regards to forestry.