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THE DEVELOPMENT OF CHARACTERISTIC WINDTHROW PATTERN IN FORESTS

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Catastrophic windthrow events in forests result from complex interaction of moving fluid, flexible plant canopy, and mechanical properties of trees and soil. The fundamental mechanisms, involving flow through dynamically responding porous media, tree sway, and gust penetration into canopies, in combination with transition processes at forest edges, require further research. Some studies dealt with model forests, where a few trees per time were linked with measuring equipment to obtain data on bending moments or investigated flow around aeroelastically scaled model forests. The occurence of large bending moments for single trees is not only a function of fetch from a leading edge, but often coincides with windwardly adjacent gaps in the canopy. Such gaps result from forest thinning, but also occur dynamically through gust penetration or failure of single trees. Devastation of complete stands is almost always preceeded by single treefall gaps. It is therefore very important to incorporate initial stages of stand failure in simulations concerning windthrow. For a better understanding of the effects of forest edge parameters, canopy structure and individual tree stability on windthrow, a model forest capable of dynamic response and successive failure has been constructed. First results of wind tunnel experiments on characteristic failure pattern are presented.