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Estimation of Miniature Forest Parameters, Species, Tree Shape, and Distance Between Canopies by Means of Monte-Carlo Based Radiative Transfer Model with Forestry Surface Model

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Abstract

A method for estimation of forest parameters, species, tree shape, distance between canopies by means of Monte-Carlo based radiative transfer model with forestry surface model is proposed. The model is verified through experiments with the miniature model of forest, tree array of relatively small size of trees. Two types of miniature trees, ellipse-looking and cone-looking canopy are examined in the experiments. It is found that the proposed model and experimental results show a coincidence so that the proposed method is validated. It is also found that estimation of tree shape, trunk tree distance as well as distinction between deciduous or coniferous trees can be done with the proposed model. Furthermore, influences due to multiple reflections between trees and interaction between trees and under-laying grass are clarified with the proposed method.

Keywords: Monte Carlo simulation, Radiative transfer, Canopy reflectance, Ellipse and cone tree shape model, Multiple reflection between trees, Interaction between trees and grass

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