FOREST GLOBAL POSITIONING METHOD AND EXPERIMENT BASED ON AGRICULTURAL MACHINERY

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ABSTRACT
To overcome the occlusion of satellite signals by dense canopy that invalidates the use of global positioning systems with agricultural machinery, the paper proposed a global positioning method to establish the global positions of forest trees. First, the domain division method of Euclidean distance and a geometric tangent algorithm are used. Then, three-dimensional data consisting of the centre points of tree trunks in the WGS-84 coordinate system are obtained by performing a spatial coordinate transformation. Subsequently, the laser scanned the newly detected trunks at a time t, and the scanning area was determined. Finally, the global positioning of trees by agricultural machinery was completed under a dense canopy. The results of field experiments showed that the standard deviation of the positioning error of the per plant tree trunk in the X, Y and Z directions of the space rectangular coordinate in the WGS-84 world coordinate system are 0.03 m, 0.04 m and 0.03 m.

Abstract
卫星信号被密集的树冠遮挡，这使得农业机械全球定位系统的应用失效，为了克服这一问题，本文提出了一种确定林木全局位置的全球定位方法。首先，利用欧几里得距离的域划分方法和几何切线算法。然后，对 WGS-84 坐标系中树干的中心点进行空间坐标变换，得到三维数据。紧接着，在 t 时，激光扫描仪对新探测到的树干进行扫描，确定了扫描面积。最后在密集的树冠下完成树木的全球定位。现场试验结果表明，在 WGS-84 世界坐标系中空间矩形坐标的 x、y 和 z 方向上，每个植物树干的定位误差的标准偏差为 0.03m、0.04m 和 0.03m。