

## 一个改进的农产品介电特性的测试系统

### Improvement on System for Determination of Dielectric Properties on Agricultural Products

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中文摘要:

介绍一种适于测量谷物(黄豆、小麦等)和某些小颗粒的观赏植物种籽及其研碎的粉状材料介电特性的测试系统,也可用在液体及含水量较高的生物材料介电特性的确定。为该“短路波导装置”而编制的计算机程序使得利用该装置的测试步骤变得很简单。用湿度为11%和17%的磨碎的小麦作样品,在工作频率为10.51GHz时,对该设备的可靠性进行测试验证,并和美国农业部(USDA)已发表的相应数据作比较,结果非常接近。对于介电常数(湿度11%和17%)和损耗因子(湿度17%),用该设备测量的结果和USDA的数据相差都在3%~5%之内。

英文摘要:

The present common microwave measurement system with the high cost is only suitable for a certain narrow frequency range, thus causing restrictions for the research work in this field. For this reason, an improved testing system based on the short circuited waveguide principle was developed and used for the practical measurement. The system is suitable for measuring dielectric properties of the materials of grain (soybean, wheat, etc.), small seeds of ornamental species and their ground powder. It is also suited to measuring complex relative permittivity for biological materials including liquid or high moisture substance. With "Statistical Analysis System (SAS)" and "curve inserting and fitting method", combining the known dielectric equations, the needed dielectric data were obtained within the widest continuous frequency range. The research of optimum combined parameters for dielectric heating treatment was speeding up. The computer program makes it quite simple to use the measuring procedures of this system. It takes only about 30 minutes to complete all measurements for a single sample with certain moisture on about ten different densities and to perform all necessary calculations with the computer program for determining the values of dielectric constant and loss factor. The instruments are reasonable simpler, and more practicable. As a result, in comparison, the differences between these datum by this simplified equipment and those of USDA, U.S. Department of Agriculture, are within the range from 3% to 5% for the dielectric constant of ground wheat on two moisture levels, 11% and 17%, at 10.51GHz and for the loss factor on 17%.

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