

A THz Measurement Platform Design for 0.2- 1.1THz

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Abstract—A precise and stable THz Measurement Platform is proposed in this paper. The displacement precision and angle precision of the platform are 0.02mm and 1° respectively. With OML or VDI extension module and Agilent N5245A PNA-X network analyzer, the THz Measurement Platform can measure waveguide components and antennas precisely in 0.2-1.1THz.

I. INTRODUCTION

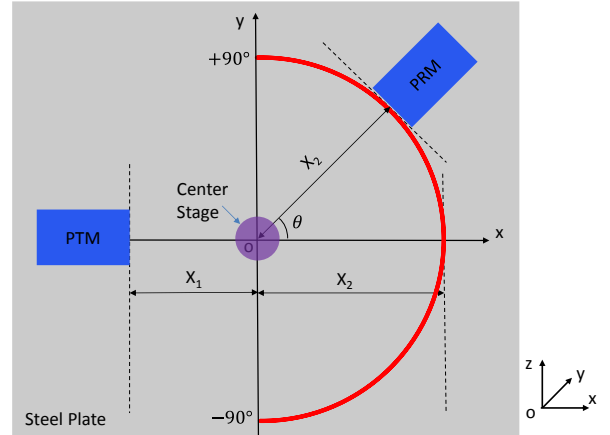
IN THz metrology field, there are lots of high quality instruments, such as VDI extension module and power meter [1]. However, if we are short of precise alignment and location system, it is hard to get high quality measurement results. The precision of the millimeter wave alignment and location system cannot meet the THz measurement requirements. To solve this problem, we designed and fabricated a THz Measurement Platform. The platform provides precise and stable THz test environment.

The platform has at least three functions in 0.2-1.1THz. The first function is to measure two-port or multi-port waveguide components. The second function is to measure co-polarization and cross-polarization fields in E-plane and H-plane of an antenna. The third function is to measure Frequency Selective Surface (FSS) and other specially required tests.

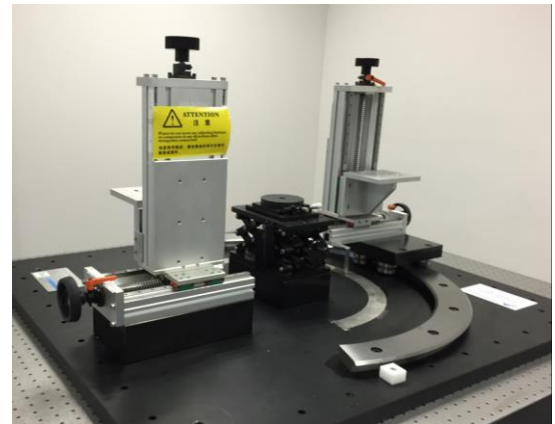
II. RESULTS

As shown in Fig. 1(a), the Platform is composed of four parts: a steel plate, a Platform of Transmitter Module (PTM), a Platform of Receiver Module (PRM) and a center stage. The steel plate (1100mm \times 1000mm \times 30mm) is used as a basement, which is placed on a Newport “M-SG-45-4” honeycomb optical breadboard (1500mm \times 1200mm \times 110mm). The center stage, located at the center point O of the steel plate, can rotate 360° around z axis with the precision of 1° , and move along z axis up and down from 0 to 70mm with the precision of 0.02mm. The PTM can move along x axis. The range of X_1 is 0-150mm with the precision of 0.02mm. The PTM can also move in vertical direction (parallel with z axis) from 0 to 200mm with the precision of 0.02mm. The PRM has the same function as the PTM. As shown in Fig. 1(a), the PRM can rotate around z axis from -90° to $+90^\circ$ with the precision of 1° . The height of the PTM and the PRM is 560mm.

The fabricated THz Measurement Platform is shown in Fig. 1(b). The gross weight of it is 180kg. The roughness of the platform is Ra0.8. The elastic deformation is less than 0.01mm. Two fitting surfaces are used to fix the OML or VDI extension modules on the PTM and the PRM. Prior to the test, a calibration is needed. The two heads of the extension modules should be placed in the center point O . We use the calibrated platform to test a VDI WR 1.0 H Diagonal Horn. The measurement results and simulation results of the radiation



(a)



(b)

Fig. 1. (a) Top view of the THz Measurement Platform schematic. (b) Photo of the fabricated THz Measurement Platform.

pattern match well. In [2], wideband terahertz reflect arrays were measured well in the platform.

III. SUMMARY

In this paper, a new THz Measurement Platform is proposed. The platform is applied to measure waveguide components and antennas.

ACKNOWLEDGMENT

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