

Shielding Effectiveness research due to antenna polarization characteristic

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Abstract— Internationally, Weapons based on EMP are rapidly developed. Meaning of EMP is abbreviation of Electromagnetic pulse. And generally, This meaning is high power electromagnetic wave. But, In the academic world, accurate representation of EMP is HPEM(High power Electromagnetic). And to minimize influence of HEMP, the shielding facility including high shielding effectiveness(SE) is being manufactured. when designing shielding facility, required units like vent, waveguide, shielding door should be included in the shielding facility. The PoEs generating by these units can drop performance of shielding facility. In this paper, To analyze these factors, After artificial the PoEs are installed, we are compared with shielding effectiveness according to vertical and horizontal polarization of antenna. And the operational frequency is 10k~1GHz defined to MIL-STD-188-125-1. But applied antenna according to frequency is different. So, we apply Loop antenna in the 10k ~ 20MHz and biconical antenna in the 20M ~ 100MHz, Log Periodic(LP) antenna in the 100M ~ 1GHz. And As defined to MIL-STD-188-125-1, the position of transmitting antenna is 2.05m away from the shielding wall. Likewise, The position of receiving antenna is 1.00m away from the shielding wall. Used the shielding room has shielding effectiveness more than 90dB. The size of shielding room is 2.4m × 6m × 2.4m. Configuration units of the shielding room are one shielding door, one filter, one waveguide. And we measure electric field strength according to shape of PoE. After we are compared with shielding effectiveness of shielding facility and shielding effectiveness of no shielding facility electric field strength, we calculate shielding effectiveness.

Keywords- PoE(Point of Entry), Shielding Effectiveness, Antenna, Shielding facility, Electric field strength

I. INTRODUCTION

Currently, the Shielding facilities to block various high-power pulse weapons or electromagnetic wave are manufactured. And, the shielding effectiveness as index to evaluate these facilities is being used. So, After we establish position of antenna and frequency scope applying the standard, the experiment is conducted and we calculate shielding effectiveness(SE).

II. MAIN SUBJECT

In this experiment, we manufacture 1×100 mm² slot in the shielding room having shielding effectiveness(SE) more than 90dB. And we measure the shielding effectiveness of the shielding room according to antenna radiation characteristic. Also, In the frequency scope 10k~1GH, we arrange Loop, Biconical, Log Periodic(LP) antenna



Figure 1. Shielding room and PoE(Point of Entry)

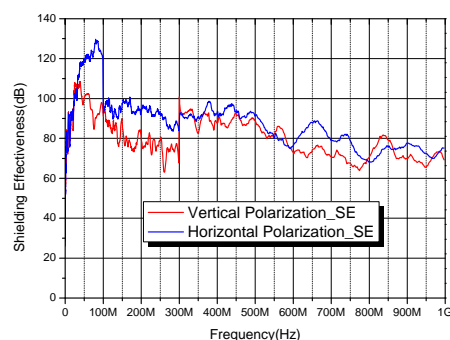


Figure 2. Shielding effectiveness comparison

In lower frequency, shielding effectiveness between horizontal and vertical polarization is almost same. But, In high frequency scope 10MHz~ 300MHz, the shielding effectiveness difference is more than 40dB.

III. CONCLUSION

Through the experiment, the shielding effectiveness of antenna's vertical and horizontal polarization about horizontal shape slot are different[1]. So, we can know the fact that plane wave of antenna according to shape of PoE is differently propagated.

REFERENCE

- [1] Lee S, Sung C, Kim E, You S, Lee J, Park D. Shielding Effectiveness of Metallic Enclosure with a Rectangular Slit Aperture. KIEES. 2012;23:652-659