Evaluation of anechoic chamber for EMI test over 1 GHz

New evaluation method using plane-wave spectral decomposition technique and optical microwave transceiver

Recently, site evaluation of anechoic chamber for EMI test over 1 GHz has attracted much attention because EU and Japan have started the regulation for the upper frequency limit of EMI from 1 GHz to 6 GHz from October 2010. The evaluation method defined by Comité International Special des Perturbations Radioélectriques (CISPR) is not enough for the detailed analysis of the anechoic chambers for EMI test over 1 GHz because it cannot identify the cause of reflections. To solve the problem, we have developed a new site evaluation method using plane-wave spectral decomposition technique and an optical microwave transceiver. The proposed method enables us to obtain the intensity and the angle of arrival of reflection waves and facilitates improving performance of anechoic chambers in the frequency range from 1 GHz to 18 GHz.

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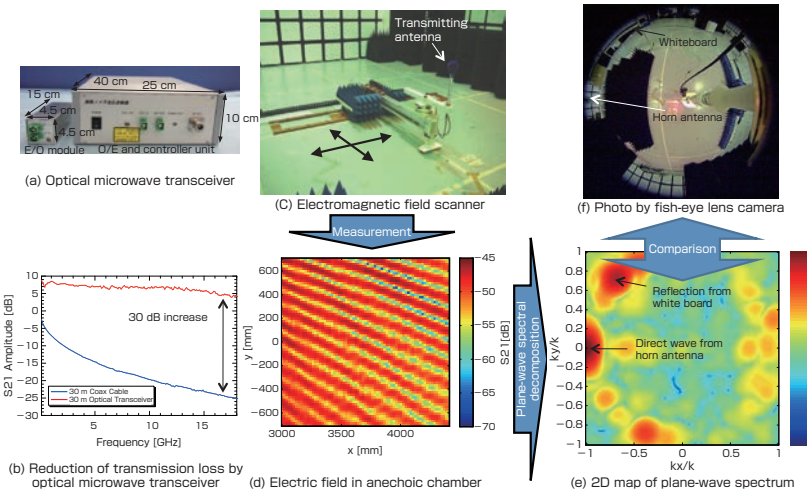

Flowchart of anechoic chamber evaluation using automated electromagnetic field scanner and optical microwave transceiver

Digital super resolution in confocal Raman microscopy

Numerical analysis of confocal volume within a sample

Confocal Raman optical sectioning is a most frequently used technique to obtain non-destructively clear images deep within a thick sample; however, this technique has been known to have the problem that the sample-induced spherical aberration degrades the quality of the images not only laterally but also axially. Here we hence consider the applicability of digital super-resolution reconstruction to this technique. Before the reconstruction we numerically analyzed so-called the “confocal volume” within a sample. The numerical analysis revealed that, with probing deeper inside the sample, efficiently-collected in-focus regions decay due to sample-induced spherical aberration. It is also found that the aberration volume is responsible for the difficulty in the quantitative interpretation of depth analysis.

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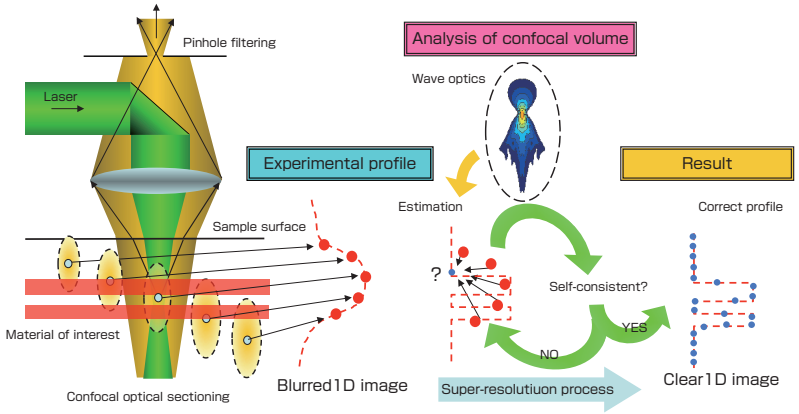

Conceptual scheme of confocal optical sectioning and super-resolution processing
Experimental profiles depend on the extent of confocal volume. The broken circles show the asymmetry in confocal volume.