

# Rancang bangun sel transverse electromagnetic dengan lempeng coplanar waveguide sebagai pembangkit medan elektromagnetik pada pengujian electromagnetic compatibility = Design of transverse electromagnetic cell using coplanar waveguide plates to generate electromagnetic fields in electromagnetic compatibility test

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## Abstrak

Transverse electromagnetic cell (sel TEM) merupakan perangkat alternatif pengujian EMC (Electromagnetic Compatibility). Namun, frekuensi operasi maksimumnya sangat terbatas sedangkan pengujian EMC mensyaratkan pengujian dilakukan hingga frekuensi 1 GHz. Beberapa pengembangan sel TEM untuk meningkatkan frekuensi operasi malah memperkecil luas keseragaman medan sedangkan peningkatan luas keseragaman medan tidak dapat dilakukan hingga frekuensi tinggi. Coplanar waveguide dapat digunakan sebagai sumber medan yang seragam dan sangat berpotensi untuk digunakan dalam perancangan sel TEM dengan rentang frekuensi yang sangat lebar. Pada tesis ini dilakukan perancangan sel TEM sederhana dengan lempeng coplanar waveguide (CPW) untuk membangkitkan medan elektromagnetik seragam yang dapat beroperasi pada frekuensi 30 MHz - 1.GHz. Hasil simulasi menunjukkan sel TEM dapat disusun dari dua buah lempeng CPW identik berukuran 510 mm x 750 mm dengan lebar hot-line  $s = 440$  mm, gap  $w = 7,69$  mm dengan jarak antara lempeng CPW sebesar  $h = 550$  mm. Hasil pengukuran menunjukkan kesesuaian antara hasil pengukuran dengan simulasi. sel TEM menghasilkan uniform area 30 cm x 50.cm dan memenuhi ketentuan standar IEC 61000-4-20.

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A transverse electromagnetic cell (TEM cell) is an alternative device for EMC (Electromagnetic Compatibility) test. The highest operating frequency of TEM cell is limited while EMC test requires testing performed up to 1 GHz. The TEM cell developments to increase the operating frequency has decrease the TEM cell field uniformity area while increasing field uniformity area cannot be done to higher frequency. Meanwhile, coplanar waveguide can be used to generate uniform field and potentially can be used to design a TEM Cells with very wide frequency range. In this thesis, a simple TEM cell was designed with coplanar waveguide plates (CPW) for generating uniform electromagnetic field at frequency 30 MHz - 1.GHz. The simulation results show that the TEM cell can be made by two identical CPW plates which has 510 mm x 750 mm in size, wide of hot-line  $s = 440$  mm, gap  $w = 7.69$  mm and the distance between the CPW plates  $h = 550$  mm. The measurement results show in agreement with the simulastion. The TEM cell produces a uniform area of 30 cm x 50 cm which is in accordance with IEC 61000-4-20 standard.