

DESIGN OF MICROWAVE EXPOSURE SYSTEMS

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Great effort is now devolved to the study of the biological effects induced by exposure to the electric, magnetic and electromagnetic fields. In particular, on account of the great number of sources of the high frequency electromagnetic fields coming from the cellular networks, as base stations and mobile telephones, the study of the biological effects of the frequencies used in these networks has been widely developed.

The idea is to realize exposure systems using flat strip lines and slotted cables whose are particularly flexible devices generally used in the cellular networks in confined areas, such as buildings and tunnels, working as a continuous distributed antenna. These devices distribute the signal power uniformly throughout the area to be covered and provide an important electromagnetic field only in the immediate vicinity of the emitter and along the line path. Then there is the opportunity to design the exposure system in order to radiate a planned spatial region with opportune sizes and shapes.

A flat strip line consists of two metallic strips with different sizes, separated by a dielectric material. The architecture of the first exposure system provides the use of a flat strip line 8 m long, supplied by a microwave signal at the frequency in the range 900-960 MHz to reproduce a typical frequency range used by the TACS-GSM radio mobile systems.

A slotted cable is a coaxial cable with carefully controlled slots in the outer conductor which allows RF signals to be transmitted from and into the cable uniformly along the length of the cable. Then, the second exposure system provides the use of a slotted cable 6 m long, supplied by the same microwave signal used for the strip line.

The effective electric field emitted by these devices has been measured in a box close to the emitting system by a wide band probe.

The analysis shows that:

- . the most of the values, 88.5 %, measured close to the flat strip line in a total volume whose dimensions are 800x20x6 centimetres;
- . the most of the values, 77.0 %, measured close to the slotted cables in a total volume whose dimensions are 600x6x10 centimetres

are distributed in the range of level $1,0 \div 3,0$ V/m. Then, the e.e.f. values produced by the strip line are distributed more uniformly than that of the slotted cable in a wider volume.

Both results suggest the opportunity to further analyse the behaviour of this configuration of strip lines and slotted cables to realize a well-known system for the exposure to the radiofrequency and microwave electromagnetic field.