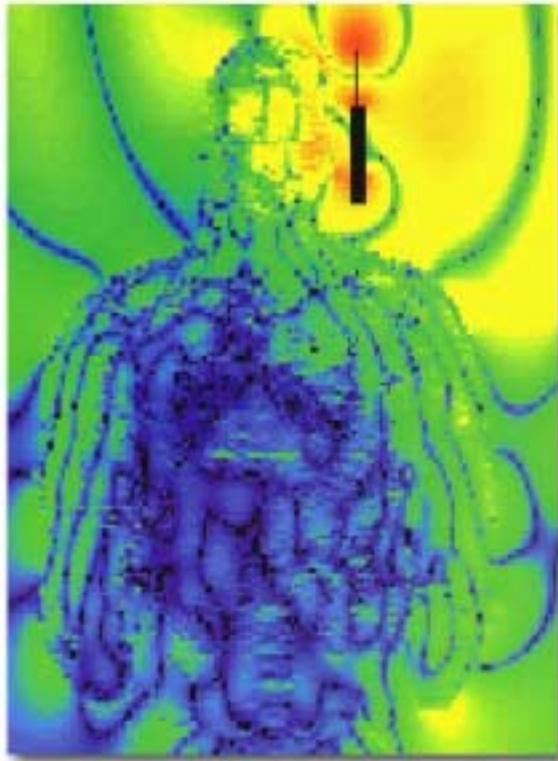


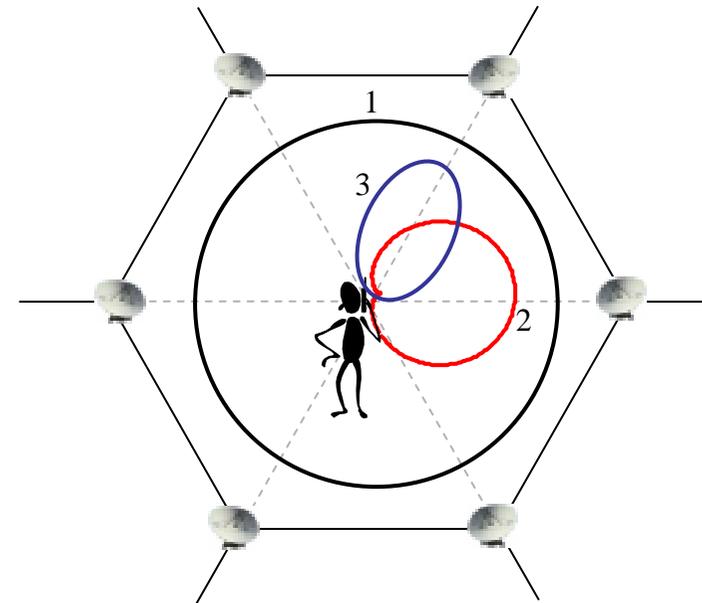
Problem Statement



The problem is to create a efficient and safe antenna structure for use in Personal Communication Facilities both in portable handsets and base stations. The demands, these devices must satisfy are almost contradictory. We develop a numerical model for the undergoing processes and create the corresponding software for the engineering use. The developed antennas, using our software are small in size, have desired radiation capabilities, beam steering ability. The important thing one must consider is the Electromagnetic Compatibility issues.

When using modern omnidirectional antennas that are widely used in cellular phones, up to 70% of radiated energy is dissipated in the user's head that is undesirable.

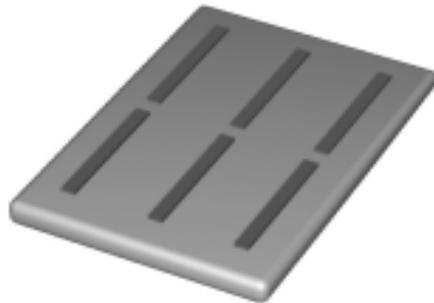
We work on the antenna optimisation both from the side of its effectiveness and safety considerations. In collaboration with the Motorola we managed to significantly decrease the dissipated in the user's tissues and improve the antenna performance and provided a way to perform a beam steering that allows to decrease the output power and prolong the battery life.



Antenna radiation patterns

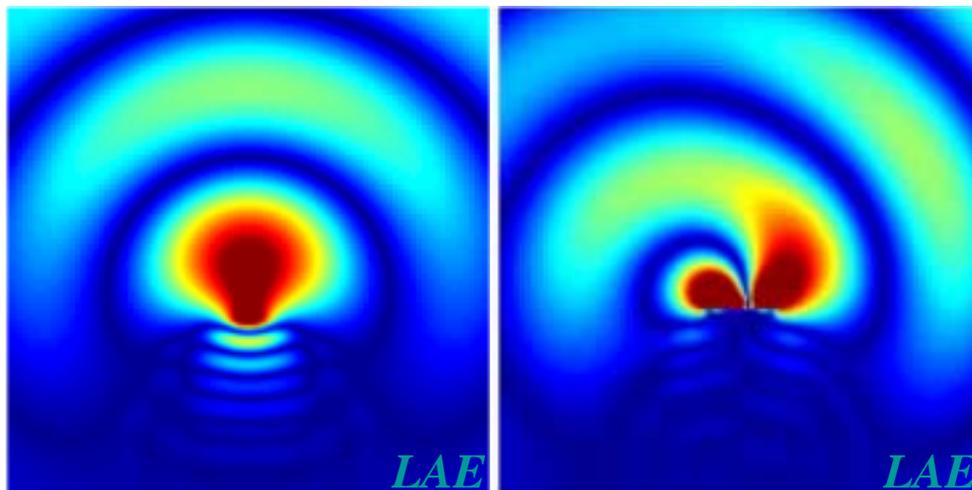
1. In a free space, not considering interaction with the user
2. Considering interaction with the user
3. Pattern of antenna with desired direction of radiation

Volume-Resonant Dielectric Antenna



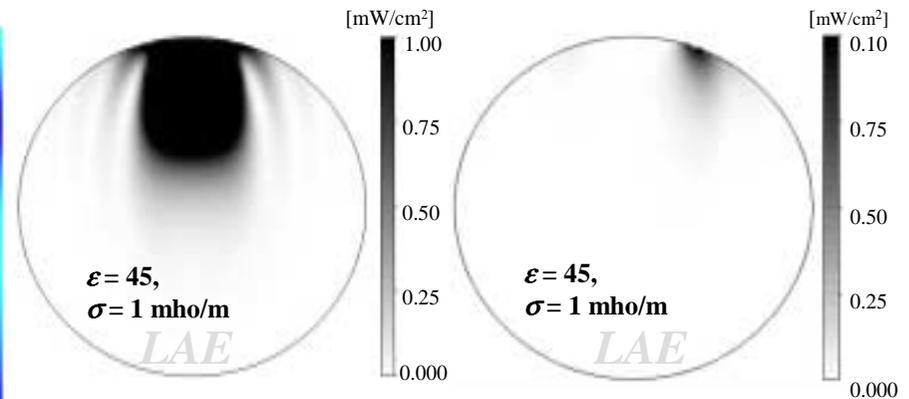
size 8 x 6 x 0.55cm

Compact adaptive volume-resonant antennas with beam-steering capability could be employed in wireless applications. The described antennas can radiate the energy in desired direction within certain range of angles by changing the amplitudes and phases of feeding currents of the dipoles printed on the dielectric substrate with a conductive back surface. The improved efficiency entails a lower RF exposure of the user for equal power emitted compared to conventional cellular phone antennas. The 3-D Method of Integrated Auxiliary Sources (MAS) is employed to study the performance of the presented antenna.



Usual Antennas

Dielectric Antenna



	Usual Antennas	Dielectric Antenna
Radiation Efficiency	30 %	95 %
Absorbed Energy percentage	70 %	5 %

As numerical result shows the main part of input energy of usual antennas absorbed by user head about 70%, when in dielectric antenna case absorption rate is only 5%. This model provides maximum security for user from radiation as you see on the pictures. Despite of good radiation parameters of antenna, it was not well matched with feeding cable. Goal of our investigation was to resolve this problem.