

Ultrawideband Antennas & Radar

Antennas having operational frequency bandwidths of more than 9:1 are needed in many applications including radar and communications. ESL has developed several unique ultra-wide bandwidth (UWB) designs that provide not only excellent frequency response but also dual-linear polarization, symmetric radiation patterns, and stable phase centers. ESL-developed UWB antennas have been used as feeds or probes for reflector antennas, in antenna measurement ranges, and in measurement applications such as ground penetrating radar.

Novel UWB Antenna Designs

An ESL-developed dielectric horn antenna covers 2 to 18 GHz with dual-linear polarization, a fixed phase center, and near-constant and symmetric beamwidths. This antenna is ideal as a feed for reflector antennas or in a compact range measurement system. A second ESL design utilizes a novel UWB dielectric probe to provide dual-linear polarization and low scattering levels. It is ideal for replacing the commonly used open-end waveguide probe in near field ranges. Another recent ESL design is the UWB, dual-linear, wave-launch antenna. This antenna is being used as an integrated tapered chamber feed. It allows operation at much lower frequencies and provides extremely pure target-zone illumination. The new design eliminates a need for changing and rotating antennas due to its wide bandwidth and circular symmetry.

UWB Ground Penetrating Radar Systems

Ground Penetrating Radar (GPR) studies were initiated at ESL in the late 1960's to extend the state-of-the-art. Recent activities in this area attempt to detect and identify buried targets such as landmines, unexploded ordnance, and pipelines or tunnels. The development of fully polarimetric UWB antennas and classification algorithms are also subjects of current research.

