Abstracts

Analysis of focusing of pulsed baseband signals inside a layered tissue medium

The derivation and application of a method designed to investigate the focusing properties of pulsed baseband signals of short pulsewidth (/spl sim/1 ns) in biological tissue media are reported. To this end, sources fed from TEM waveguides, concentrically placed at the periphery of a three-layer cylindrical lossy model, are assumed. A Fourier-series-based methodology, appropriate for a useful class of pulse train incident signals, is presented and utilized to study the dynamics of pulse propagation inside the tissue medium. The propagation of each spectral component of the incident field within the tissue medium is analyzed by applying an integral-equation technique and a Fourier-series representation is used in order to obtain the time dependence of the electromagnetic fields produced at any point within tissue due to the pulsed excitation of the array elements. Numerical results are computed and presented at several points in a three-layer geometry, 20 cm in diameter, irradiated by an eight-element waveguide array. Focusing at a specific point of interest within tissue is achieved by properly adjusting the time delay of the signals injected to the individual applicators of the array.

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