Abstracts

Design and analysis of an asymmetrically fed insulated coaxial slot antenna with enhanced tip-heating performance

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In this paper, a novel use of an asymmetrically fed insulated coaxial slot antenna (ICSA) type of applicator for interstitial microwave hyperthermia that simultaneously exhibits good impedance matching and enhanced tip-heating performances is presented. Theoretical analysis reveals that by making the distal arm much shorter than the other arm of the antenna, charge densities distributed over the distal arm of the antenna increase significantly. This, in turn, can result in the radial electric-field component becoming the dominant contributor to the specific absorption rate (SAR) over the distal arm side of the heating region and, therefore, the achievement of enhanced tip-heating performance. With the length of the longer arm chosen to be slightly longer than a quarter-wavelength, good impedance matching and enhanced tip-heating performances are achieved when the length of the shorter distal arm is reduced to no more than 25% of that of the longer arm. Good agreements observed between theoretical and measured SAR patterns for two ICSA's designed for operation at 915 and 433 MHz, respectively, confirm the validity of the design method.

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