

# MODIFICATION OF LUCITE HORN APPLICATOR WITH RESPECT TO FREQUENCY BANDWIDTH

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## Introduction

This paper describes two possible modifications of the lucite horn applicator to achieve larger frequency bandwidth. The applicators are designed at working frequency 434 MHz. The results were obtained using 3D electromagnetic field simulator. These modified applicators can be also used as a receiving antenna to the monitoring of temperature in radiometry system. In this system is required to use the applicators with broadband impedance matching to the treated area.

## Methods

The electromagnetic field is excited in the waveguide which has got geometrical dimensions to provide only dominant mode  $TE_{10}$ . The lucite horn with aperture of 125x90 mm is connected to the waveguide to achieve more uniform distribution of the electromagnetic field inside the aperture. Two centimetres thick water bolus ( $\epsilon_r = 78$ ) is inserted between the aperture of the horn and agar phantom ( $\sigma = 0,8$  S/m,  $\epsilon_r = 54$ ). The coaxial-to-waveguide adapter is optimized in 3D electromagnetic field simulator to developed lucite applicator with larger frequency. On the fig. 1A is shown classical adapter which is most often used adapter and its possible modifications (fig. 1B-C).

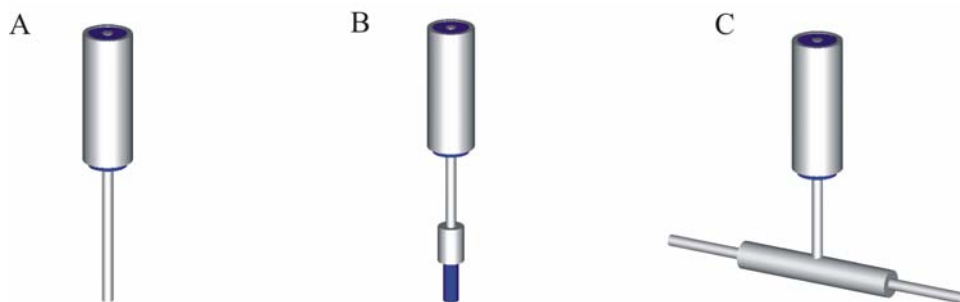


Fig. 1: Coaxial-to-waveguide adapters

For the classical adapter the obtained frequency bandwidth ( $S_{11}$  parameter is under -10 dB) is 60 MHz. For the both modified models we achieved similar frequency bandwidth of 100 MHz. The 3D SAR distribution in agar phantom didn't change using modified coaxial-to-waveguide adapters.

## Conclusion

Two possible modifications of the lucite horn applicator were developed with respect to achieve larger frequency bandwidth. The results of the 3D SAR distribution are presented as well.

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