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Microwave imaging is an imaging technique that can be applied to human brain tissues with the potentiality to improve diagnostic ability and to enable earlier diagnosis in the case of trauma and stroke patients [1]. The current most used medical imaging modalities are magnetic resonance imaging (MRI) and computerized tomography (CT) that are assessed and reliable diagnostic tools, however they can be time consuming, costly, not available for bedside monitoring, and harmful due to ionizing radiations (in the CT case only). Hence, microwave imaging can be considered as a complementary diagnostic imaging technique, in particular for bedside and ambulance human head monitoring (see e.g. the systems described in [2], [3]).

In this contribution we present the experimental validation and testing of a 3-D microwave imaging system for brain stroke and hematoma monitoring. The realized system is reported in [4] and is the extension to 3-D imaging of the 2-D system described in [5]. In order to generate 3-D brain images, the antennas/sensors array is placed conformal to upper part of the human head on a helmet-like support. The number, position and orientation of the antennas as well as the choice of the working frequency band and of the dielectric characteristics of the coupling medium have been done accordingly to the rigorous design procedure as described in [6]. The experimental validation and testing of the realized 3-D microwave imaging system is performed with anthropomorphic head phantoms [7] realized with 3-D printed technologies and filled with proper liquid mixtures to mimic the dielectric behavior of the different brain tissues and of the blood area, representing a stroke or a hematoma inside the brain.

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