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Spatial In-Body to On-Body Channel Characterization Using an Accurate UWB Phantom

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Abstract— UWB systems have emerged as a possible solution for future wireless in-body communications. However, in-body channel characterization is complex. Animal experimentation is usually restricted. Furthermore, software simulations can be expensive and imply a high computational cost. Synthetic chemical solutions, known as phantoms, can be used to solve this issue. However, achieving a reliable UWB phantom can be challenging since UWB systems use a large bandwidth and the relative permittivity of human tissues are frequency-dependent. In this work, a measurement campaign within 3.1-8.5 GHz by using a new UWB phantom is performed. Currently, this phantom achieves the best known approximation to the permittivity of human muscle in the whole UWB band. Measurements were performed in different spatial positions, in order to investigate also the diversity of the in-body channel in the spatial domain. An experimental in-body to on-body (IB2OB) scenario is considered. From the measurements, a new path loss models is obtained. Besides, the correlation in transmission and reception is computed. Our results show the correlation varies depending on the position of the receiver and transmitter.

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