

## **Monitoring the dielectric properties and propagation conditions of mortar for modern wireless mobile networks**

### **ABSTRACT**

Recently, modern wireless communication applications are extended to call high frequency bands including millimeter waves for 5G systems. Therefore, the propagation properties of such waves in different media have attracted many researchers. In this work, the results of the S-parameters measurements of mortar with four thicknesses are obtained using a nondestructive free space measurement technique for the frequency bands from 8 GHz up to 32 GHz. The obtained results of the dielectric properties and loss factors for the prepared mortar samples are realized. The variation in both the reflection and transmission coefficients and the dielectric properties with curing time conditions of mortar structure is examined. The dielectric properties of water are realized using the proposed method to subtract the effects of water contents from the prepared mortar samples. The effects of the sample thickness and relaxation frequency are considered. The obtained measurements are compared to the simulated results based on a full wave simulation software package of CSTMWS algorithms. Finally, excellent agreements are achieved between the simulated and measured results.