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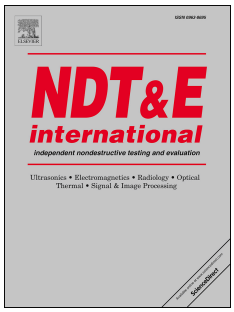

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An Investigation into the railway ballast dielectric properties using different GPR antennas and frequency systems

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Abstract

This paper presents an investigation into the relative dielectric permittivity of railway ballast using ground-penetrating radar (GPR). To this effect, the experimental tests are carried out using a container (methacrylate material) of the 1.5 × 1.5 × 0.5 m dimensions. GPR systems equipped with different ground-coupled and air-coupled antennas and central frequencies of 600 MH, 1000 MHz, 1600 MHz and 2000 MHz (standard and low-powered antenna systems) are used for testing purpose. Several processing methods are applied in order to obtain the dielectric permittivity of the ballast system under investigation. The comparison of the results identify critical factors as well as antennas and central frequencies most suited for purpose.

Keywords: Ground-penetrating radar (GPR); Railway ballast; Non-destructive testing; Antenna frequency; Antenna systems; Relative dielectric permittivity.

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