



GPR dipoles orientation in road pavement cracking identification

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Cracks in road pavements are the main distress mechanism that influences its performance, compromising the comfort and the durability of the asphalt layers and, consequently, of the entire pavement. These cracks can occur from the pavement surface or from the bottom of the asphalt layers and run across the entire asphalt layer thickness. For a suitable design strategy of the pavement rehabilitation, the identification of these cracks is crucial both in terms of origin (from top to bottom or from bottom to top) as well as in terms of length. For both types of cracks, its identification through current practice needs extensive in situ sampling mainly through pavement coring that is time consuming and extremely expensive.

In the basis of this framework, new procedures are needed for the identification of cracks in road pavements, mainly in the class of non-destructive methods that are able to provide fast and reliable information for the design of the rehabilitation of road pavements.

Ground Penetrating Radar (GPR) has proved to be an equipment useful for road inspection and was used in this work for the identification of cracks in pavements. In this work, GPR is tested for two different high frequencies and antenna dipoles orientation (transverse and parallel to the cracks), because the application of parallel dipoles to the crack direction seemed to be more suitable for the identification of extremely narrow objects as cracks, than the traditional way of GPR measurements.

Thus, a series of laboratory and in situ GPR tests was carried out for the identification of cracks with different heights and from different sources (from top to bottom and from bottom to top). Two ground coupled antennas with two central high frequencies were used (1.6 and 2.3GHz) and a more noticeable identification of cracks was obtained when dipoles are parallel to the crack's development.