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Application of an impulse ground penetrating radar in assessment of the interlayer connection condition of the bituminous pavement

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Ground Penetrating Radar (GPR) technique is commonly used in nondestructive diagnostics of pavement. The method allows to estimate the pavement thickness and localize the places where general changes in pavement construction occur. Use of 2 GHz impulse, air coupled antenna, after reduction of the disturbing influence of the masking background allows to perform some more precise tasks like investigation of the layer structure of the asphalt packet and assessment of the interlayer connection type considering its electromagnetic properties (e.g. dielectric constant) of material constituting vicinity of the interface. Former investigations showed that structure of the interface manifested in reflection properties expresses also important technological properties of the boundary (delaminations, presence of alien material at the interface, insufficient compaction occurring at the base of layer, water penetration etc.).

The paper is devoted to description of the most common types of reflections corresponding to interlayer interfaces. The major terms used for some classification of reflection types refer to simplified, idealized structure of the interlayer planar and horizontal interface i.e. the *single reflection* corresponding to the contact of two contrasting homogeneous media and the *double reflection* corresponding to the thin crevice between two non-contrasting layers, which is filled by contrasting material. These simple models allow to formulate clear diagnostic criteria of reflection type and provide some way of amplitude interpretation. Nevertheless the attribution of the reflection type is usually a difficult task in the field practice, because of complicate structure of the real boundaries. Some other category of reflexes corresponds to wider zone between two layers where gradual change of material properties occurs.

The paper presents basic concepts related to the major reflexes types, their exemplification using laboratory examples and practical application of this methodology for pavement diagnostics purposes in real field situations.