Geophysical Research Abstracts
Vol. 20, EGU2018-15885-2, 2018
EGU General Assembly 2018

Validation of road pavements thickness using GPR data for inverse analysis of pavements

Jorge Pais (1), Francisco Fernandes (2), Simona Fontul (3), Mattia Fagnano (4), Andrea Benedetto (4), and Luca Ciampoli (4)

(1) University of Minho, Guimaraes, Portugal (jpais@civil.uminho.pt), (2) University Lusiada - Norte, Famalicão, Portugal (fmcpf@civil.uminho.pt), (3) National Laboratory of Civil Engineering, Lisbon, Portugal (simona@lnec.pt), (4) Roma Tre University, Rome, Italy (andrea.benedetto@uniroma3.it)

Road pavements are designed to support the traffic under the existing climatic conditions and are expected to exhibit a smooth surface with adequate texture and friction to provide good traffic circulation during its design life span. For structural purposes, road pavements must support heavy traffic without producing distresses before the end of the design period.
Following the construction and during its life period, the structural quality of the road pavement structure is regularly assessed to evaluate the stiffness of the pavement layers, necessary to predict the pavement remaining life. The latter is predicted by applying transfer functions, usually known as fatigue life laws, and the strain levels installed in the road pavement due to traffic loads. These strain levels can be calculated from the stiffness of the pavement layers obtained by an inverse analysis of the road pavement.
The main difficulty of the inverse analysis is related to the conflict between the stiffness of the rigid layer of the pavement foundation and the thickness of the subgrade. However, knowing one of these variables, mainly the thickness of the subgrade, the inverse problem becomes relatively easy to undertake. There are some numerical models that can be used to estimate this thickness, considering more or less pavement state variables.
Thus, the objective of this work is the validation of these models for a new road pavement where the entire constitution of the pavement layers is known, including the subgrade thickness. Additionally, the pavement layers were measured by Ground Penetration Radar (GPR) by using different central frequencies antennas, ones suitable for the identification of the top layers of the pavement and others to measure the pavement foundation.
Comparisons between GPR data and pavement construction data was undertaken and the validation of the models to predict the pavement thickness was carried out.