Road profile identification utilizing acceleration of a moving vehicle

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【Background】

Road profile is one of the important indicators which represents conditions of roads or bridges. By keeping road profile as smooth as possible, not only riding comfortability of cars but also a lifespan of roads and bridges can be increased. The method to identify pavement roughness by utilizing acceleration data measured on a moving vehicle has been developed in recent years, which is so-called a drive-by method. The drive-by method enables to reduce costs and labors more than existing methods, however it is hard to secure high accuracy.

【Objective】

This study is intended to discuss and compare accuracy of road profile identification methods utilizing measured accelerations on a moving vehicle.

【Approach】

The accuracy of road profile identification is discussed focusing on ways of deriving a state-space equation and the parameters to be identified by the inverse problem. The identified results are evaluated by an error function and root mean square error (RMSE) of power spectral denstiy (PSD) of identified roadway roughness profiles.

【Publication plan】

・SHMII-10, The Tenth International Conference on Structural Health Monitoring of Intelligent Infrastructure

・EVACES2021, The 9th International Conference on Experimental Vibration Analysis for Civil Engineering Structures 2021 Tokyo

【Results】

It was confirmed that the method which identifies the roadway roughness profile directly by the least square minimization has higher accuracy than that identified by means of the moving force identificxation (MFI) method.
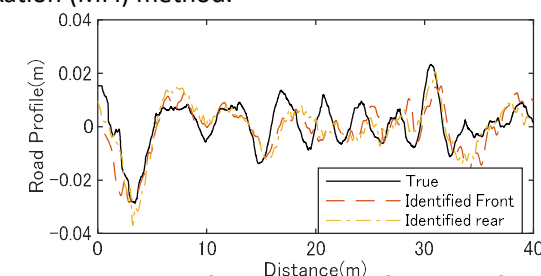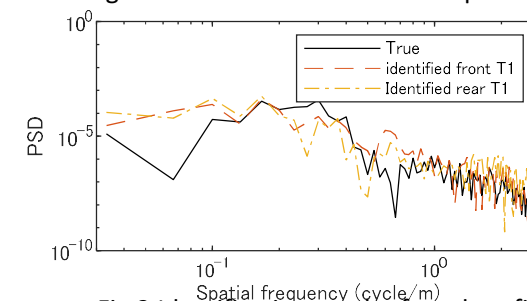

Fig.1 Identification result of road profile

Fig.2 Identification result of road profile