



Passive monitoring using traffic noise recordings - case study on the Steinachtal Bridge

Johannes Salvermoser, Simon Stähler, and Céline Hadziioannou
LMU Munich, Geophysics, Munich, Germany (hadzii@geophysik.uni-muenchen.de)

Civil structures age continuously. The early recognition of potentially critical damages is an important economical issue, but also one of public safety. Continuous tracking of small changes in the medium by using passive methods would offer an extension to established active non-destructive testing procedures at relatively low cost.

Here we present a case study of structural monitoring using continuous recordings of traffic noise on a 200 meter long reinforced concrete highway bridge in Germany. Over two months of continuous geophone records are used in the frequency range of 2-8 Hz. Using passive image interferometry, evaluation of hourly cross-correlations between recordings at pairs of receivers yield velocity variations in the range of -1.5% to +2.1%. We were able to correlate our outcomes with temperature measurements of the same two month period.

The measured velocity changes scale with the temperature variations with on average a dv/v of 0.064% per degree Celsius. This value is in accordance with other studies of concrete response to temperature, confirming that we are able to observe subtle changes with physical origin. It is shown that traffic noise is temporally homogenous enough to fulfill the requirements of passive image interferometry.