

## **FILTERING TECHNIQUES FOR ENHANCING EXTRACTION OF BRIDGE FREQUENCIES FROM A MOVING TEST VEHICLE**

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**Key Words:** *Band-Pass Filter, Filter, Singular Spectrum Analysis, Spectrum, Vehicle-Bridge Interaction.*

By letting an instrumented test vehicle move over a bridge, the frequencies of the bridge can be identified by picking the peaks in the Fourier response spectra of the test vehicle. One problem with this approach is that the vehicle frequency, which is not desired, usually appears as a dominant peak in the spectrum, making it difficult to identify the bridge frequencies, which are desired. To enhance the visibility of the bridge frequencies of concern, an effective filter technique is needed to filter out the undesired vehicle frequency.

As a preliminary attempt in this study, three filters are adopted, i.e., the band-pass filter (BPF), singular spectrum analysis (SSA), and the singular spectrum analysis with band-pass filter (SSA-BPF), proposed herein as a combination of the above two. Through the numerical study on two cases with the vehicle frequency smaller or larger than the 1<sup>st</sup> bridge frequency, the SSA-BPF technique is demonstrated to be most effective for extracting the bridge frequencies, due to its salient feature that there is no need to select the number of singular values, as required by SSA, while the unexpected peaks encountered by the BPF are avoided.

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