

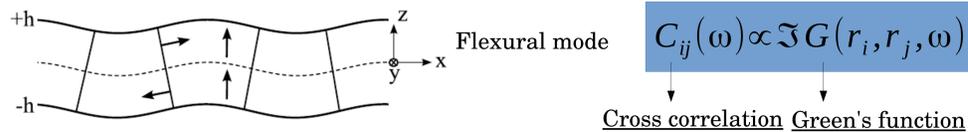
1 Introduction

According to seismic/acoustic interferometry, the cross correlation of ambient signal recorded at two receivers is related to (and can be used to measure) the Green's function associated with the receiver locations, provided that the ambient wave field is sufficiently diffuse. Whether the field is diffuse depends on the geographic distribution of noise sources, scatterers, and/or reverberating surfaces [1,3].

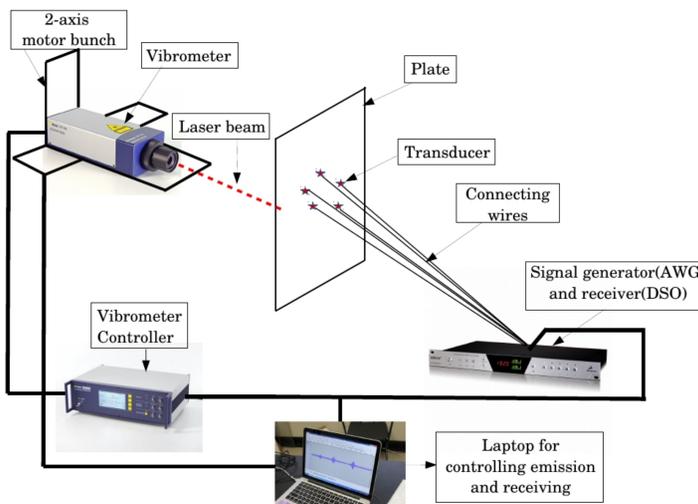
2 Target

- Building cross correlations implementing small scale experiments
- Exploring the properties of the obtained cross correlations for different source distributions and different length of the cross correlation window
- Studying the role of non-deterministic noise on cross correlations
- Investigating the role of scatterers in the Green's function reconstruction

3 Lamb Waves



4 Experimental setup



As shown in Figure 1, our experimental setup, similar to that of Colombi et al., [2] consists of a duralumin plate with five piezoelectric transducers attached to its surface. In practice, we only observe the fundamental antisymmetric Lamb mode A_0 .

Figure1. Experimental setup consisting of a duralumin plate, five transducers, a laser vibrometer and a signal emitter/receiver.

References

- [1] Boschi, L., and Weemstra, C. (2015), Rev. Geophys., 53
- [2] Colombi, A., L. Boschi, P. Roux, and M. Campillo (2014), JASA., 135
- [3] Campillo, M., and Roux, P. (2015), Treatise on geophysics., 1

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Experimental Green's Function Reconstruction for two source distributions



Uniform distribution

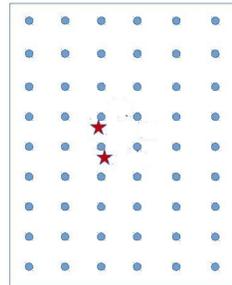


Figure2a. Schematic illustration of uniform source distribution.

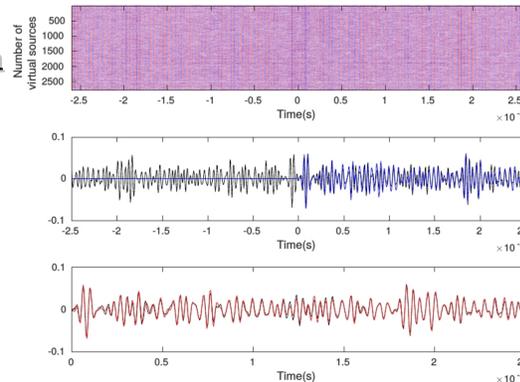


Figure2b. Top: Cross-correlation gather, Middle: Cross-correlation stack (black) compared with time-integral of direct GF. Bottom: Comparison between positive time (black) and negative time stacked cross-correlation.

Circular distribution

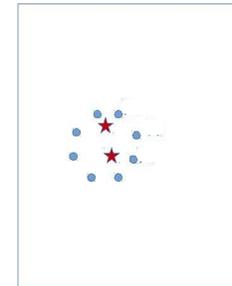


Figure3a. Schematic illustration of circular source distribution.

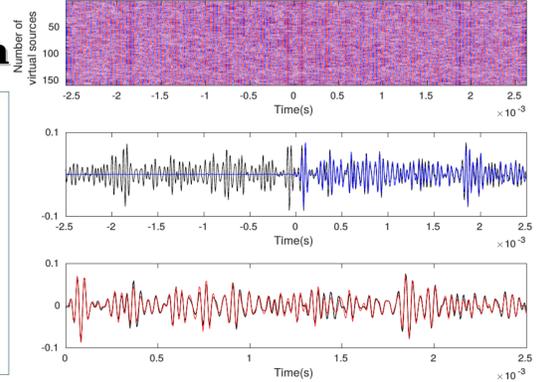


Figure3b. Top: Cross-correlation gather, Middle: Cross-correlation stack (black) compared with time-integral of direct GF. Bottom: Comparison between positive time (black) and negative time stacked cross-correlation.

6 Cross correlation of time-windowed signals

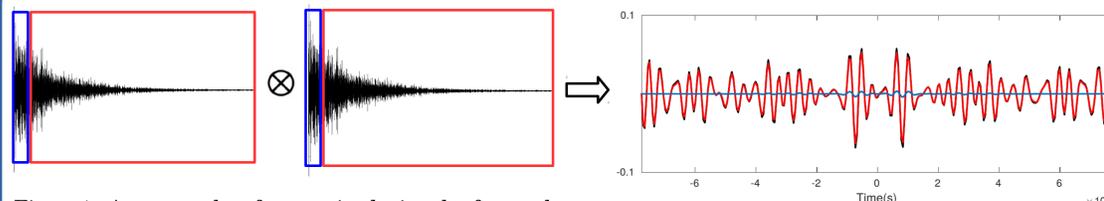


Figure4. An example of a received signal after pulse compression of the emitted chirp signal. Colored frames mark the windows over which the cross correlations are obtained. (Colors correspond to the ones in Figure5.)

Figure5. Comparison of cross-correlation results for three different time windows shown in Figure 4, when sources are distributed over all the plate.

- 1) Cross-correlating only the coda arrivals builds both ballistic and coda parts of the GF.
- 2) Contribution of direct arrivals is negligible compared to the one of coda part.

8 Instrumental-related noise

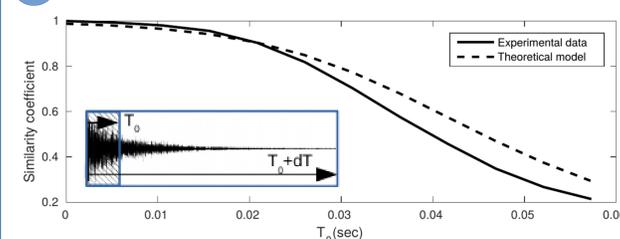


Figure7. Similarity coefficient between the cross correlation obtained by cross correlating two limited windows (with T_0 between 0 and 57 ms and T_0+dT fixed to 250 ms) and the one obtained by cross correlating full time signals and over all sources versus T_0 .

9 Scattering medium and Green's function reconstruction: Numerical and experimental approach

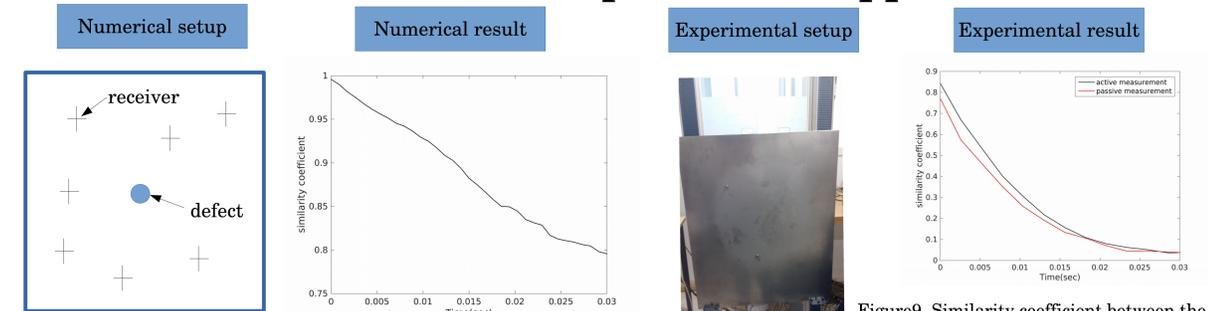


Figure8. Similarity coefficient between the GFs with and without the defect.

Figure9. Similarity coefficient between the GFs with and without the defect, measured actively and reconstructed passively.