

**Non linear inversion of microtremor array measurements
for deriving S-wave velocity vertical profiles**

M. Wathelet - D. Jongmans

LIRIGM, Grenoble University, France

Passive recordings of seismic noise are increasingly used in earthquake engineering to in-situ measure the shear wave velocity profile at a given site. Ambient vibrations, which are assumed to be mainly composed of surface waves, offer the advantage of not requiring artificial sources. Due to the data uncertainties and the non-linearity of the problem itself, the solution of the dispersion curve inversion is generally not unique. Stochastic search methods like the Neighbourhood Algorithm allow to look for minima of the misfit function by investigating the whole space of parameters. Due to the limited number of parameters in surface wave inversion, they constitute an attractive alternative to linearized methods. On this basis, an efficient tool was developed to invert the 1D Vs profile from passive or active source experiments. As the number of generated models is usually high in stochastic techniques, a special attention has been paid to the optimization of the forward computations. Also, the possibility of inserting a-priori information into the parameterization was introduced in the code.

The developed tool is successfully tested on synthetic data, with or without a-priori information. We also present an application to real array data measured on a site in Brussels (Belgium), whose geology is made of about 110 m of sand and clay layers overlying a Paleozoic basement. Active and passive source data proved to be very complementary and allow to retrieve a Vs profile consistent with borehole data available at the same location.