

Seismic reconstruction using FWI with dual-sensors data.

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joint work with Giovanni Alessandrini[†], Hélène Barucq*, Maarten V. de Hoop[‡], Romina Gaburro[§]
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We study the inverse problem for the time-harmonic acoustic wave equation. The seismic context implies restrictive set of measurements: it consists of reflection data (resulting from an artificial source) acquired from the near surface area only. The inverse problem aims at recovering the subsurface medium parameters and we use the Full Waveform Inversion (FWI) method, which defines an iterative minimization algorithm of the difference between the measurement and simulation.

We investigate the use of new devices that have been introduced in the acoustic setting. They are able to capture both the pressure field and the vertical velocity of the waves and are called *dual-sensors*. For solving the inverse problem of interest, we define a new cost function, adapted to these two-components data. We first note that the stability of the problem can be shown to be Lipschitz, assuming the parameters to be piecewise linear.

The usefulness of the cost function is to allow a separation between the observational and numerical sources. Therefore, the numerical sources do not have to coincide with the observational ones, offering new possibilities to create adapted computational acquisitions, and possibilities to reduce the numerical burden. We illustrate our approach with three-dimensional medium reconstructions, where we start with minimal information on the target models.

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