FWI using an initial velocity model derived from CRS attributes.

Yuri Shalom de Freitas Bezerra[1*] and German Garabito[1]; [1]UFRN

Abstract

The Full Waveform Inversion (FWI) method requires an accurate initial model to find a correct solution. Traveltime Tomography (TT), Migration Velocity Analysis (MAV), or horizontal well log interpolation are some of the methods used to build an initial velocity model, which are time-consuming and need human interaction to update the velocity model. As an initial solution for FWI, another alternative is to use velocity models that are generated during the conventional processing of seismic data. Therefore, some authors proposed the use of the NMO/DMO velocity model transformed to interval velocities in depth domain as input for FWI. Therefore, some authors have proposed using the velocity model obtained by NMO/DMO velocity analysis, transformed into interval velocities in the depth domain, as input to the FWI. Then, if the standard velocity models are sufficiently approximate, FWI could be applied more routinely.

The Common Reflection Surface (CRS) stacking method automatically obtains kinematic attributes of the wavefield that can be used to build a time migration velocity model. The velocity model obtained by CRS is a good approximation of the RMS velocity and better focuses migrated events in the time domain than the NMO/DMO velocity. Therefore, the migration velocity model transformed into interval velocities in the depth domain can be a good alternative to be used as the initial velocity model in the FWI method.

The objective of this work is to apply the FWI method using an initial velocity model obtained from the CRS attributes. Unlike the MNO/DMO velocity model, which is interactive, the speed model is automatically determined from the CRS attributes, making the proposed workflow more attractive. Unlike the MNO/DMO velocity model that is determined interactively, our initial velocity model is determined automatically from the CRS attributes, making the proposed workflow more attractive. In Figure 1 we present the preliminary results of the FWI method, where Figure 1a is the true velocity model, Figure 1b is the depth domain interval velocity model from the CRS attributes, and Figure 1c is the results of the FWI method. As a continuation of this work, we intend to apply this workflow to the Marmousi data and to real data.

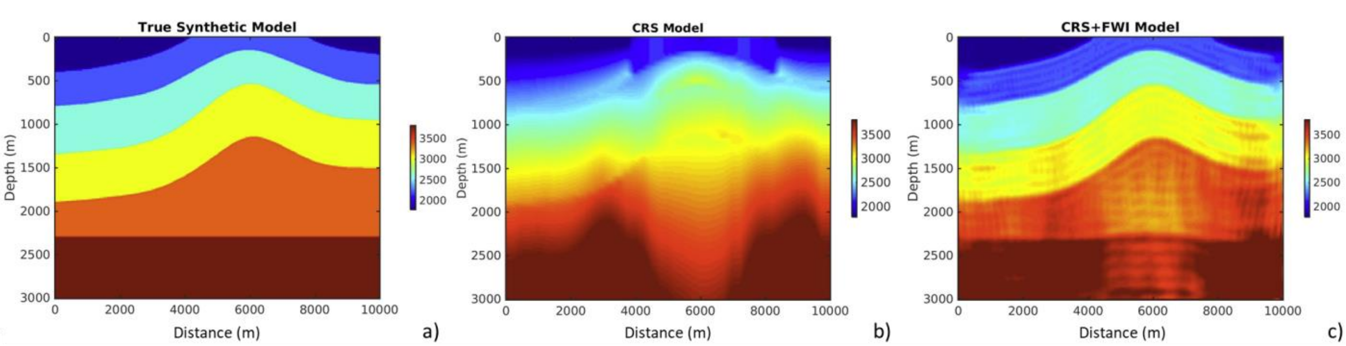

Figure 1 – Velocity model composed for homogeneous layers: a) true model, b) velocity model from CRS attributes, and c) velocity model obtained with the FWI method using a frequency range of 5 Hz to 10 Hz, and 67 shot gathers.