SEISMIC INVERSION IN STEPS (C-5)

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   At first glance it may appear attractive to carry out seismic inversion as a single inversion process. Starting with an initial litho-stratigraphic model the seismic response is simulated and compared with real seismic measurements. Using an optimization algorithm, the model parameters are adjusted such that the difference between the simulated seismic data and the measured seismic data is minimized. This concept of inversion (also referred to as data fitting) is simple, but in practical situations the procedure seldom leads to meaningful results. The reason for this is that, in practice, inversion problems are almost always 'ill-posed', meaning that the amount of information present in the measurements is too small with respect to the number of model parameters to be estimated. This is particularly true for the seismic inversion problem. The message of this paper is that the seismic inversion problem does not require another, more advanced, optimization algorithm, but another, more advanced, inversion strategy. The subsurface parameters to be estimated are subdivided into a number of ranked groups. Once a group of parameters has been estimated, its effect is eliminated from the seismic measurements by 'model-driven processing' and the next parameter group is estimated. Hence, we propose applying seismic inversion by a consecutive number of 'estimation-processing' steps. For each estimation step prior information can be provided and, above all, a result analysis can be carried out before moving on. The importance of such an inversion strategy is illustrated with examples.

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