WAVEFIELD EXTRAPOLATION TECHNIQUES FOR INHOMOGENEOUS MEDIA WHICH INCLUDE CRITICAL ANGLE EVENTS. II. APPLICATIONS IN MODELLING, MIGRATION AND INVERSION (326)

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It has been shown by Berkhout that a seismic experiment can be elegantly described by a sequence of independent one-way processes, which is schematically represented by

$$S \rightarrow W^{+} \rightarrow R \rightarrow W^{-} \rightarrow D \rightarrow P.$$

A wavefield, generated by sources S at the surface, propagates downward into the medium, which is described bv one-way wavefield extrapolation operator W^{+}. In the subsurface this wavefield is reflected, described by R, and propagates upward to the surface again, described by one-wave operator W^{-}. At the surface the wavefield is registered by detectors D, resulting in a seismic section P. This simplified model is valid for sub-critical angle events only, as interaction between downgoing and upgoing waves is neglected. Based on this model, Berkhout discussed modelling as well as migration schemes for subcritical data.

In part I of this paper we discussed an alternative approach to the WKBJ technique. According to this approach, a seismic experiment including critical events can also be described by the above-discussed one-wave scheme. Now W^{+} and W^{-} represent WKBJ one-way extrapolation operators, while R represents the reflectivity at the turning plane. Consequently, modelling as well as migration of seismic data, including critical events, can be described by schemes similar to those discussed by Berkhout, as will be shown in this part of the paper. Based on the migration scheme for critical angle data, a recursive one-dimensional inversion scheme will be proposed which computes velocity gradients. The resulting low-frequency velocity trends may provide indispensable background medium information for linearized multidimensional inversion techniques.

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46th annual EAEG meeting, London