P039 THE SENSITIVITY OF P- AND S-AMPLITUDES FOR ELASTIC MACRO MODEL ERRORS

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Introduction

Macro models are the basis for any wave field extrapolation or migration process. The accuracy with which to define such a macro model depends on whether one would like to obtain only structural information or whether one would like to use amplitude information as well in order to extract lithologic information. In case of the latter it is important to estimate macro boundaries as accurate as possible to minimize the influence of angle dependent transmission effects. An evaluation of the influence of these errors on the amplitude of the transmitted wave field will be presented. Also a discussion will follow on the question whether to decompose the elastic data *before* or *after* downward extrapolation.

Transmission effects

A wave field that propagates through an elastic medium undergoes several changes in wave form and amplitude. The factors that cause these changes are
1) inhomogeneities (anisotropy),
2) angle-dependent transmission,
3) spherical divergence and
4) absorption.
At first these factors effect the 'primary' transmitted wave field. Of course, the *total* transmitted wave field consists of a primary wave field and a scattered wave field. The scattered wave field can be thought of to represent all the other wave fields besides the primary wave field such as multiply reflected and converted waves. In this paper we shall concentrate on the effects of the angle-dependent transmission on the primary transmitted wave field and present a quantitative sensitivity analysis of these effects.

Why *P* and *S* decomposition should take place *before* downward extrapolation

Another factor that plays a role in the migration process is the consistency or rather the inconsistency of the *P* and *S* macro models. This inconsistency is one of the reasons why one should decompose the elastic data into separate *P* and *S* data *prior* to downward extrapolation. It is argued that because of the inconsistency a loss of resolution should be expected when extrapolating the *P* and *S* events in the data simultaneously (see Fig.1). (Algorithms based on the extrapolation of the total elastic wave field can be found in for instance Kuo and Dai, 1984 and Chang and McMechan, 1987.) Decomposing the data into separate *P* and *S* data before extrapolation also creates the opportunity to estimate *P* and *S* macro models independently. Another advantage is that after decomposition 'conventional' acoustic algorithms may be applied to the decomposed data sets. More sophisticated elastic algorithms for the extrapolation of decomposed data that preserve crucial elastic amplitude information

can be found in Wapenaar and Haimé, 1990.

References

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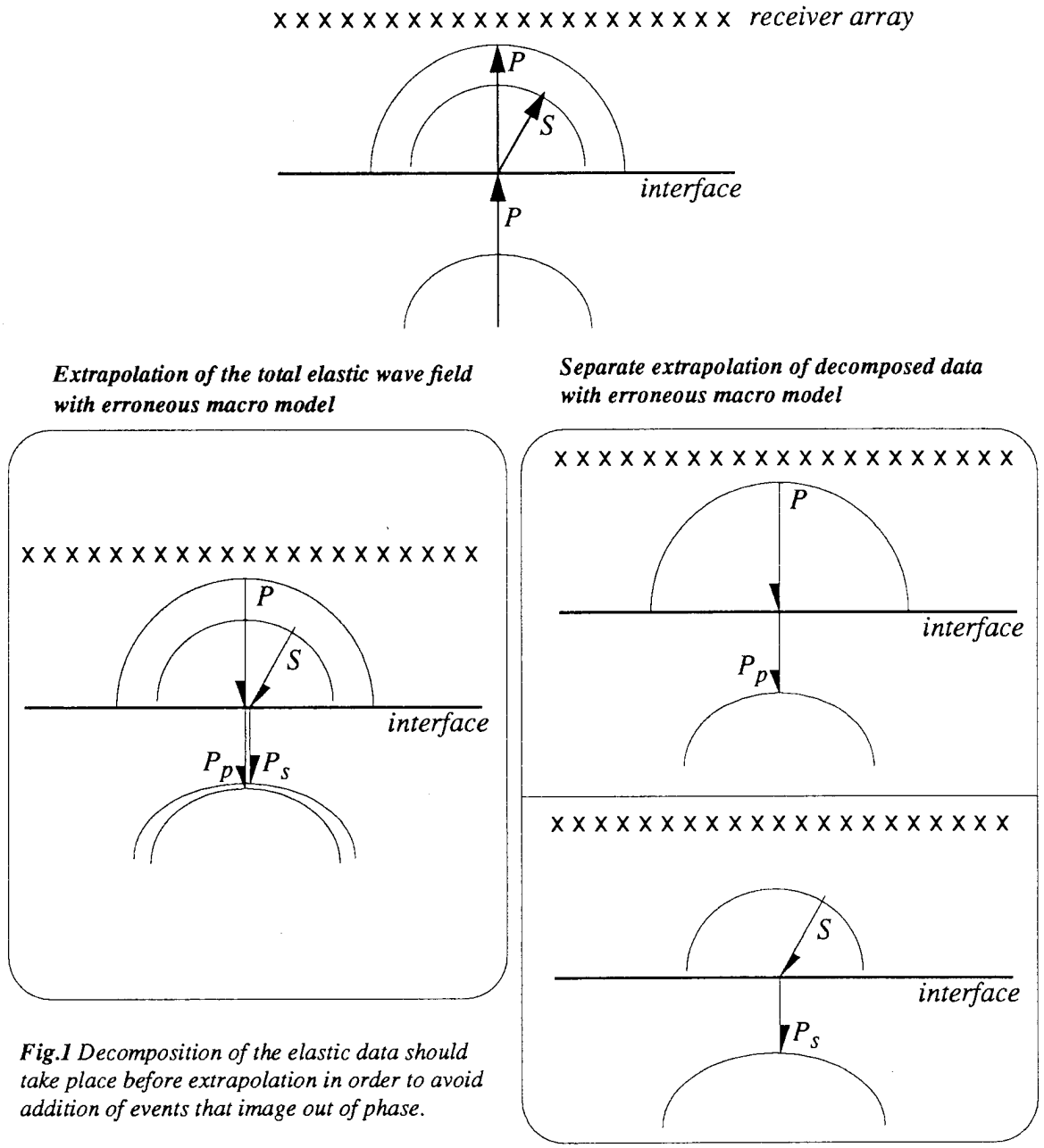

Fig.1 *Decomposition of the elastic data should take place before extrapolation in order to avoid addition of events that image out of phase.*