

## Chapter 6. Summary and Conclusions

A theory for the modelling and suppression of wide angle diffracted multiple reflections has been developed. The proposed theory expands previous deterministic approaches to the problem and seems to represent the most advanced and complete deterministic technique for multiples removal to date.

Besides incorporating diffractions and other wave related phenomena such as geometrical spreading, the theory allows for lateral variations of reflector depths and coefficients. In addition, it correctly models waves propagating at angles up to approximately 40 degrees from the vertical. For simplicity, the theory was developed neglecting the angular dependence of the reflection coefficients, transmission effects and intrabed multiples. The last two assumptions are reasonable for marine data. In the eventuality it is necessary, a generalization of the theory to include both effects does not seem to represent a major task.

The general theory is based on the scalar wave equation, but for the case of relatively undisturbed reflectors, where diffractions are not significant, a simpler equivalent theory, based on a ray approximation, has been developed as well. The ray theory approximation is shown to be a limiting case of the more general theory.

Two important aspects of the practical implementation of the theory are discussed. The first is the definition of data consistent with the theory. The wave stacks are reviewed and shown to be valid data for this type of processing. Detailed criteria and examples of the optimum choice of parameters for the stacking are given.

Secondly, the theory requires an a priori knowledge of the source waveform. The last part of the thesis discusses and illustrates two different techniques for its estimation. Both techniques are in their initial state of development and although preliminary tests are quite encouraging, the methods have not been sufficiently tested on real data to draw a definite conclusion on their performance. The remaining problem seems to be that the techniques cannot estimate long waveforms, which appears to be the actual case for real data. Thus, an extension of the method or a preprocessing of the data to shorten the waveform seems to be necessary. Once this difficulty is overcome, it is my feeling that the theory will be sufficient to handle real data with wide angle multiple reflections.