



Surface-based Internal Multiple Elimination in the CMP Domain – Theory and Application Strategies on Land Seismic Data

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Abstract

The data-driven internal multiple elimination (IME) method based on feedback model, which includes CFP-based, surface-based and inversion-based methods, are successfully applied to marine datasets. However, these methods are computationally expensive and not always straightforward on land datasets. In this paper, we first proved that the surface-based IME method, which is the most computationally efficient method among the three methods, can be derived from the CFP theory. Then we extend it to CMP domain under the assumption of locally lateral invariance of the earth, which makes it more computationally efficient. In addition, we proposed applying a time-variant taper based on the first Fresnel zone to predict the multiples more precisely. Besides, the improved S/N ratio and dense offset distribution can be obtained by using the CMP supergather, which makes the CMP-oriented method more suitable for land data. Some practical processing strategies are proposed via case study. The effectiveness of the proposed method is demonstrated with the application to synthetic and field data.

Key words: internal multiple, feedback model, surface-based, CMP-oriented, land seismic data.