INVERSE PROBLEMS IN SEISMIC SURVEYS

Beverley J. Moore

1. INTRODUCTION

Seismic surveys are commonly used in the exploration for oil and natural gas to help picture the subsurface structure in the region of interest. One way of displaying the data recorded is by means of an unmigrated stacked section (see fig. 1). However, this gives a distorted picture of the subsurface structure because of the refractive effects produced by the variations in velocity. The next step is to determine a good coarse-scale velocity model to use in "migrating" the data to its true location. In this paper, a generalised linear inversion technique is used to derive the coarse-scale velocity model. [1, 2] have used a similar approach in their study of this problem although they worked with a different selection of data from the seismic survey compared with that outlined in this paper. Such an inversion technique addresses a problem inherent in many existing interval velocity modelling methods: velocity errors cumulative with depth. It also permits input data to be weighted according to its accuracy or some other criteria. Weighting of data becomes desirable especially in the over-determined problem and also when mixed data sets are used such as a combination of stacking velocities and two-way travel times from the unmigrated stacked section of seismic data as in this investigation.