

Vertical well : Rig Source VSP

APPENDIX

Calculation of dip and offset of diffraction points from VSP data

Calculation of the angle of dip

The computation of the angle of dip is very straightforward, but involves making two assumptions:

- (1) The dipping reflector is a planar, uniform surface.
- (2) The velocity of the material above the reflector can be regarded as constant.

The first assumption is reasonably secure in regions of "well behaved" structure, and does not significantly affect the accuracy of the calculations. The second assumption may not be as reliable particularly in regions where there may be significant velocity changes in the near surface. If the dips are generally below 30° , however, the errors introduced are again minimal; the basic consideration here is that the reflection points remain reasonably close to the well location. Even in areas of great structural variation and high dip, accurate calculations can be performed if geophone stations close to the reflector are chosen for the calculations.

If one considers the two geophone stations in figure 1, it can be seen that an image point can be generated such that

$$SO = OI \quad \text{and} \quad SR = RI$$

Where :

S is the source

I is the image point

α is the angle of dip

G1 is geophone 1

G2 is geophone 2

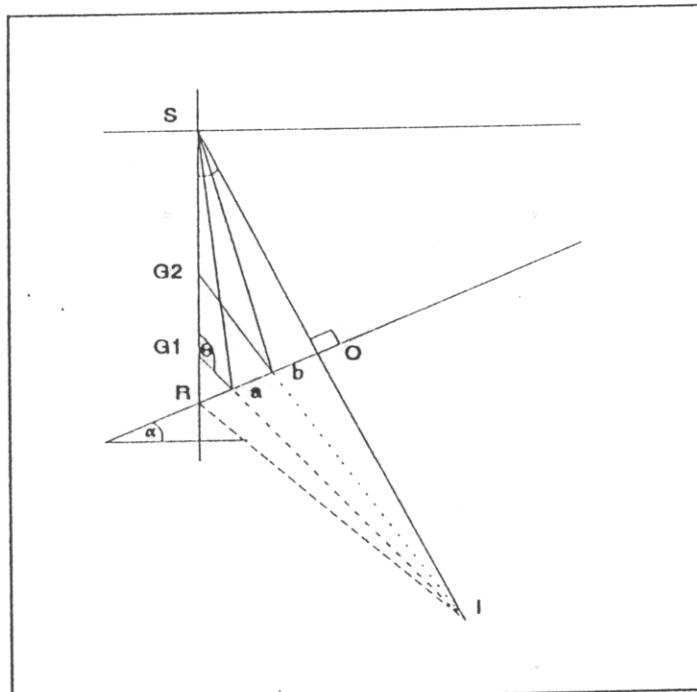


Figure 1 Dipping reflector

5 cm