地震勘探原理 双语教学材料

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Exercise 7

h_1=200 m, v_1= 1000 m/s, ρ_1=1500 kg/m^3

v_2= 1500 m/s, ρ_2=2000 kg/m^3

(a) Calculate the reflection and transmission coefficients (R, T, ER and ET) for the vertically travelling P waves.
(b) Calculate the t_0-time, critical distance x_{crit}, and the crossover distance x_{cross}.
(c) Construct a traveltime diagram (direct Wave, Reflection and Refraction).
(d) A seismic wave is incident normally on a reflector with a reflection coefficient R of 0.01. What is the proportion of the incident energy transmitted?

Exercise 8

To find the depth to bedrock in a dam-site survey, traveltimes were measured from the shot-point to 12 geophones laid out on a straight line through the shotpoint. The offsets x range from 15 to 180 m.

Determine the depth of overburden from the data in the Table.

X(m)	T(ms)
15	19
30	29
45	39
60	50
75	59
90	62
105	65
120	68
135	72
150	76
165	78
180	83

Exercise 9

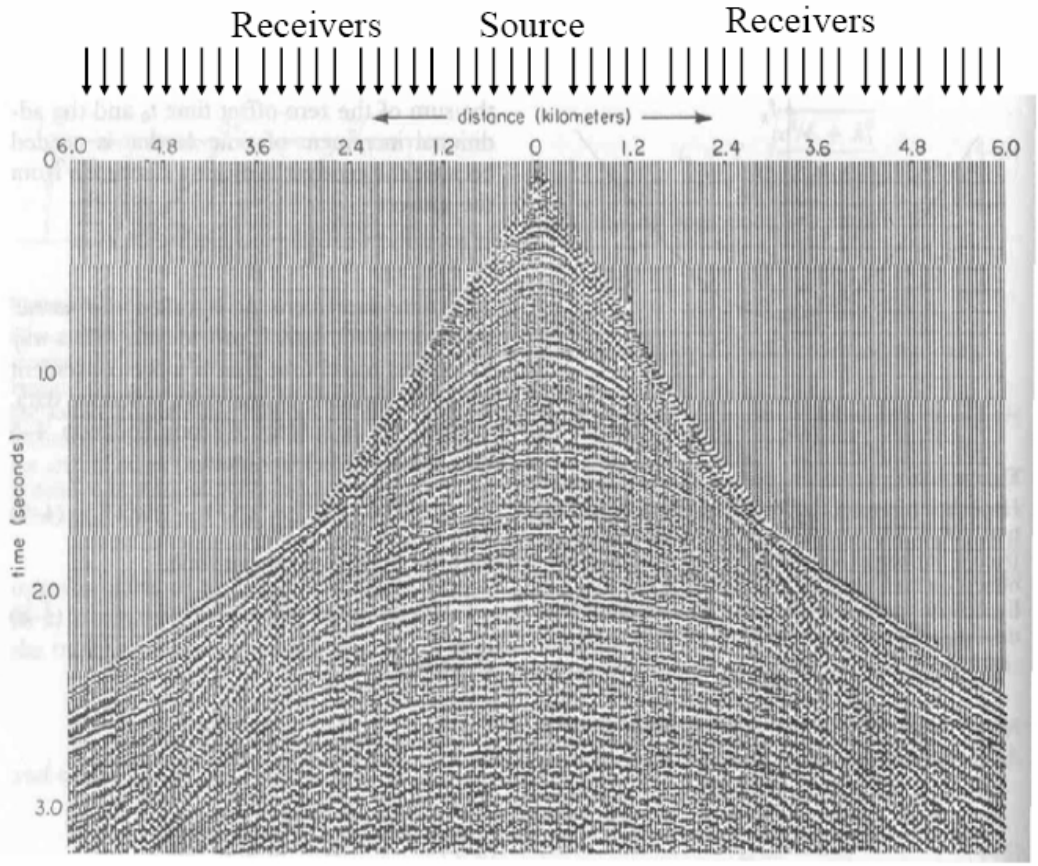
Given is the following Layered earth:

h_1= 15 m, v_1= 600 m/s
h_2= 40 m, v_2= 1500 m/s
h_3=100 m, v_3= 2300 m/s
h_4=150 m, v_4= 3000 m/s

(a) What is the root-mean-square (RMS) velocity in reflection surveying, and how is it related to the interval velocity and to stacking velocity?
(b) Determine the RMS-velocity for each layer.
(c) Determine from the RMS-velocities the interval velocities for each separate layer.

Exercise 10

Try to distinguish the following seismic events in the picture shown on the next page:

- direct wave,
- two refracted waves,
- two reflected waves that come from the same interface as the refracted waves.

Try to obtain the velocity of the different layers using the direct wave and the refracted waves.