AVO effect of elastic wave modelling

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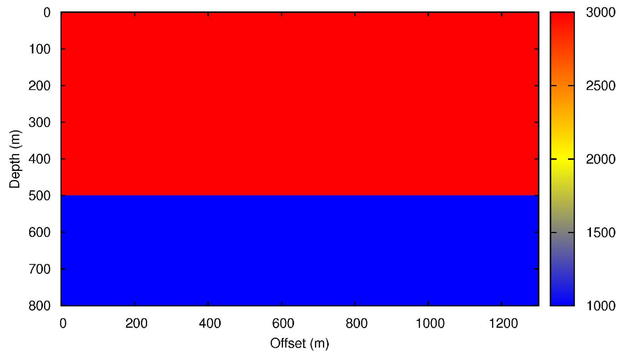
Overview

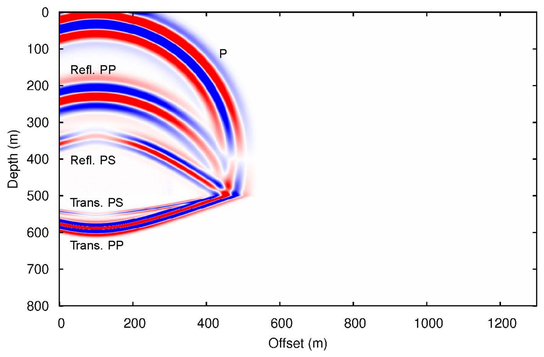
- Reflection coefficients are studied from 2D P-SV cases of wave-equation based elastic wave modelling. The modelled results are compared to analytical results obtained from Zoeppritz equations.

Wave modelling

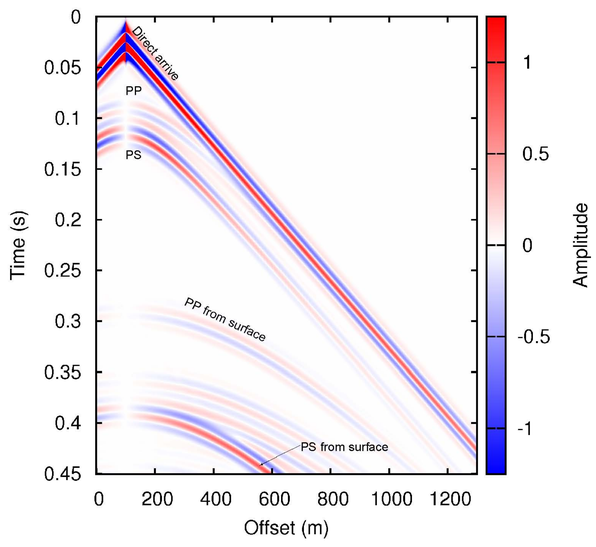
- A modelling experiment was done using a staggered-grid FD method and with a P-wave source at (100*m*, 400*m*) and receivers at 400*m*.



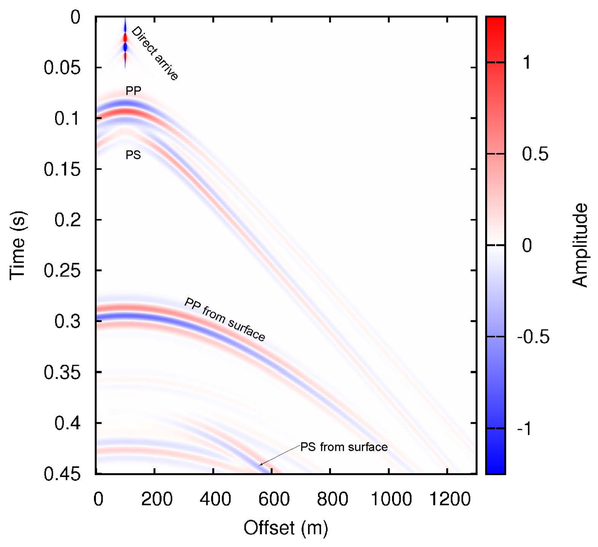
A two-layer subsurface model.



Vertical component snapshot at time 0.15s. Energy source is at (100m, 400m).



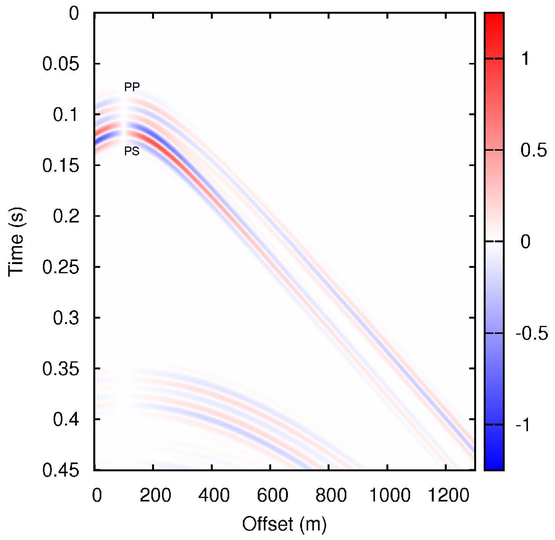
Horizontal component recorded at 400m.



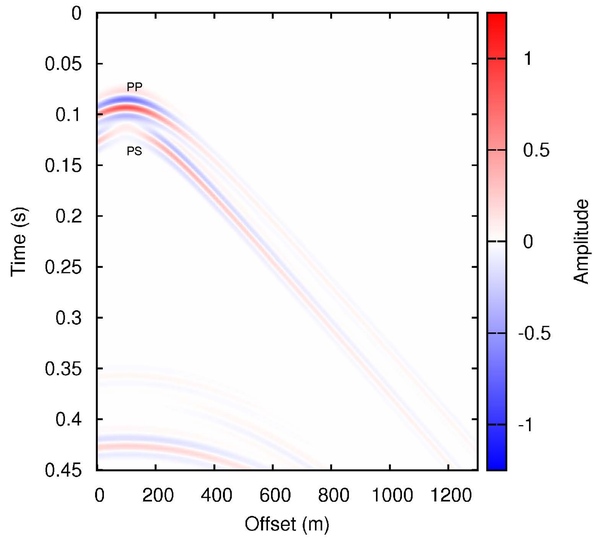
Vertical component recorded at 400m.

Measuring PP reflection coefficients

- Perform another modelling the same, except the subsurface contains only a homogeneous media the same as the surface layer. Substraction of the records removes the direct arrivals and the surface PP reflections. Thus PP are separated.



PP Separated: horizontal component



PP Separated: vertical component

- Perform a third modelling with an energy source at (100m, 600m) in the homogeneous medium. A point on the P wavefront has the same geometry spreading as a corresponding point on the PP in the above modelling. Thus the amplitude ratio represents the PP reflection coefficient.