

Elastic waves

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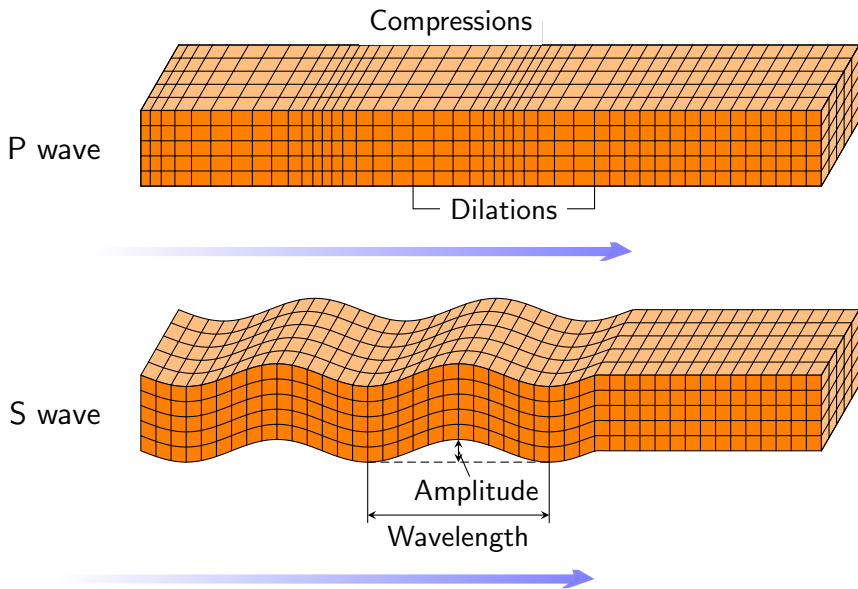
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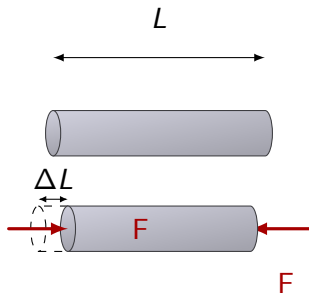
UNIS, Svalbard April 2024

Content

1. P-waves and S-waves
2. Reflected waves
3. Refracted waves
4. Head waves
5. Diving waves
6. Rayleigh Waves

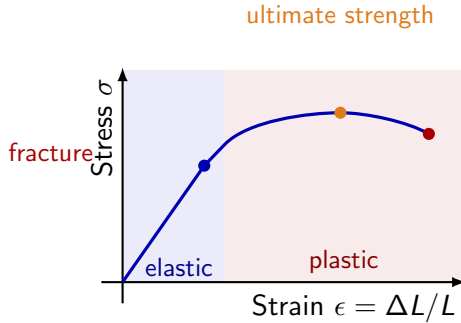


Hooks Law



$$F = \kappa \Delta L \quad (1)$$

STRESS - STRAIN

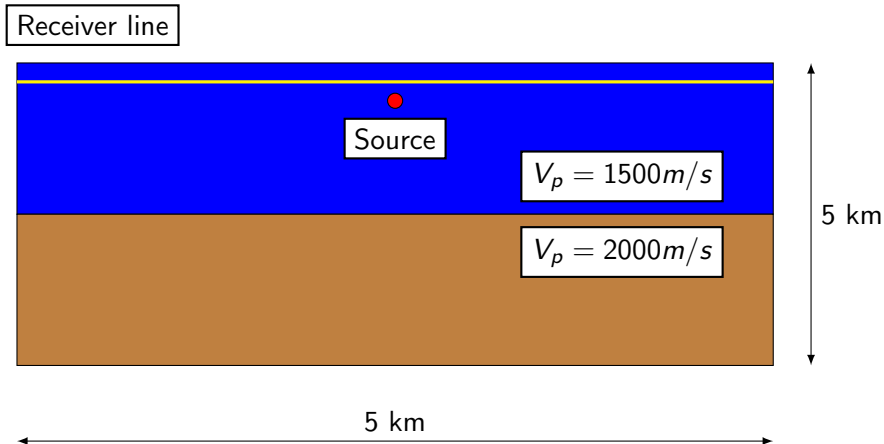


Newton and Hook's laws

$$\text{Force} = \text{mass} \times \text{acceleration}$$

$$\text{Stress} = \text{Stiffness} \times \text{Strain}$$

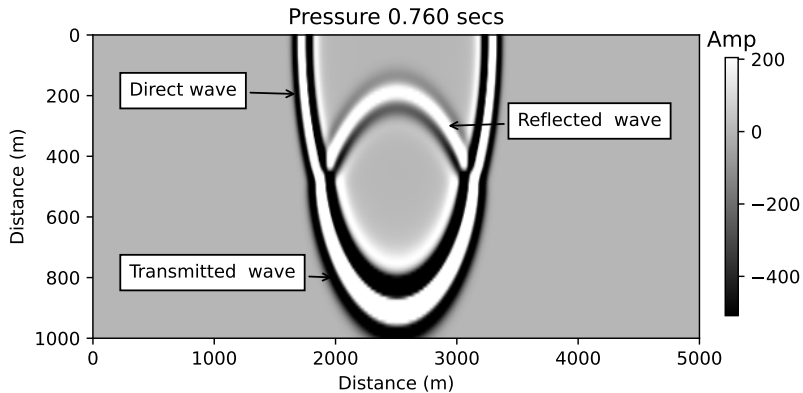
Simple model



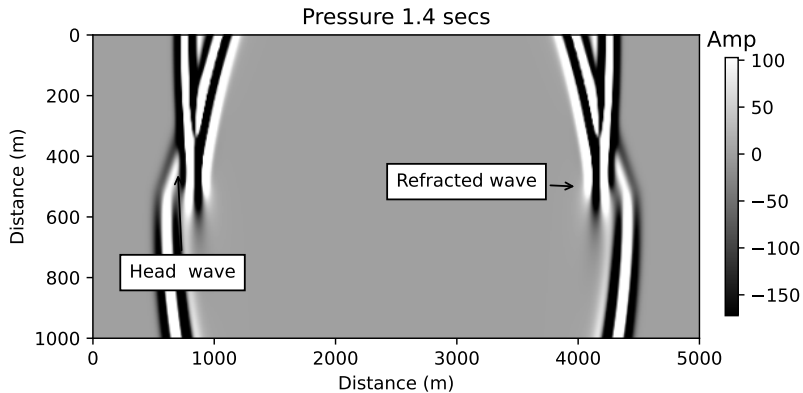
P-waves

Movie-1

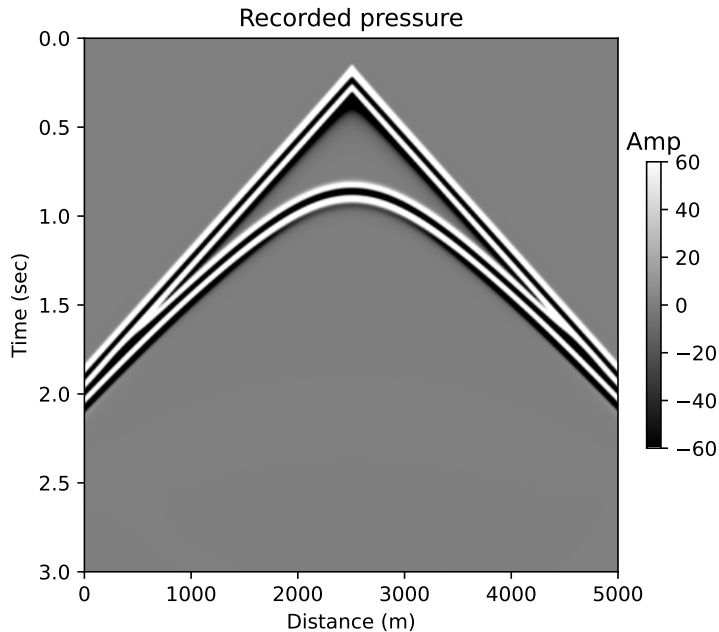
P-waves



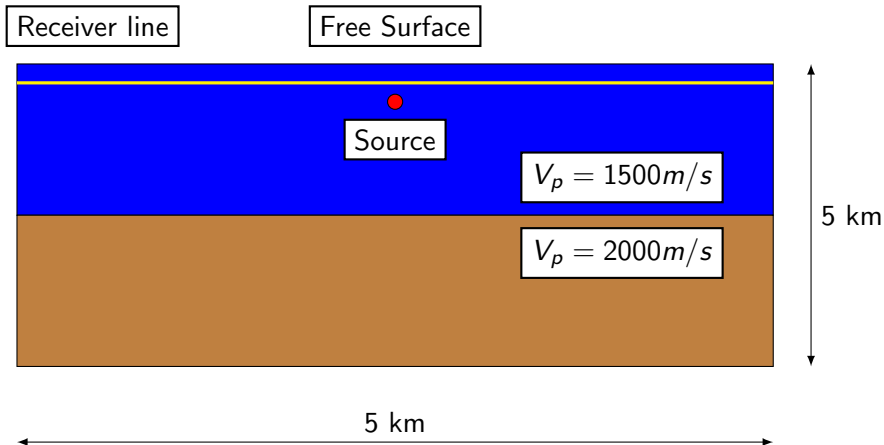
P-waves



P-waves



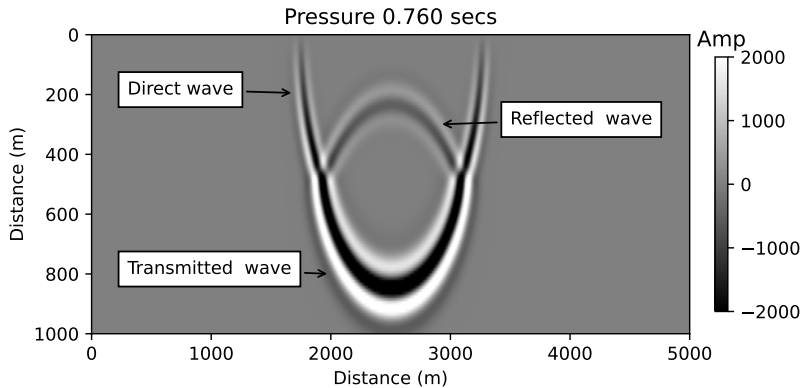
Model with free surface



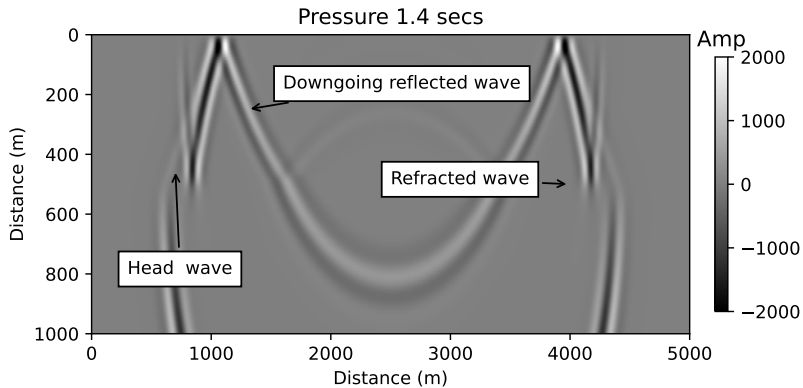
P-waves free surface

Movie-2

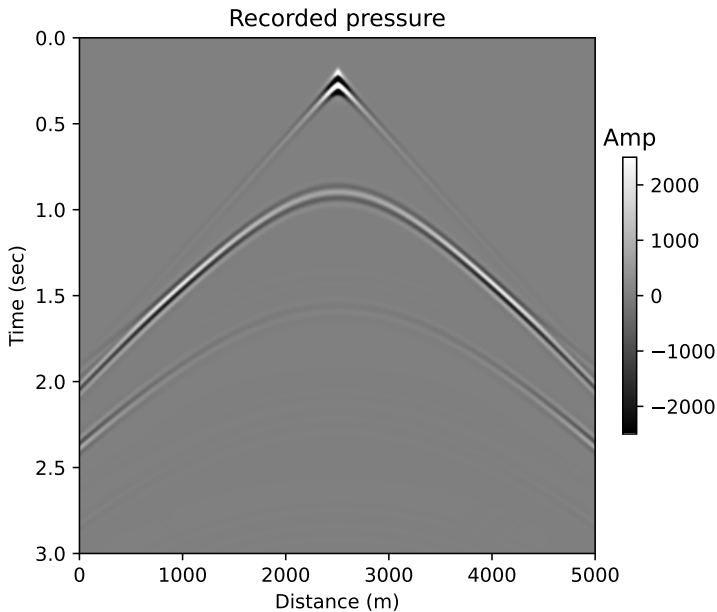
P-waves free surface



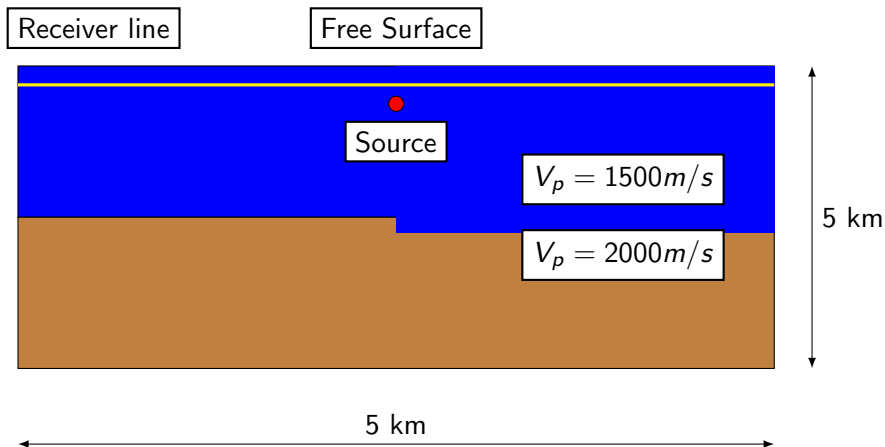
P-waves



P-waves free surface



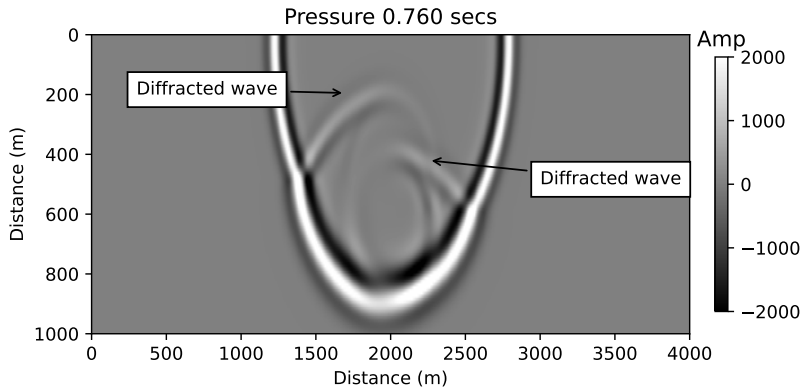
Diffracted waves



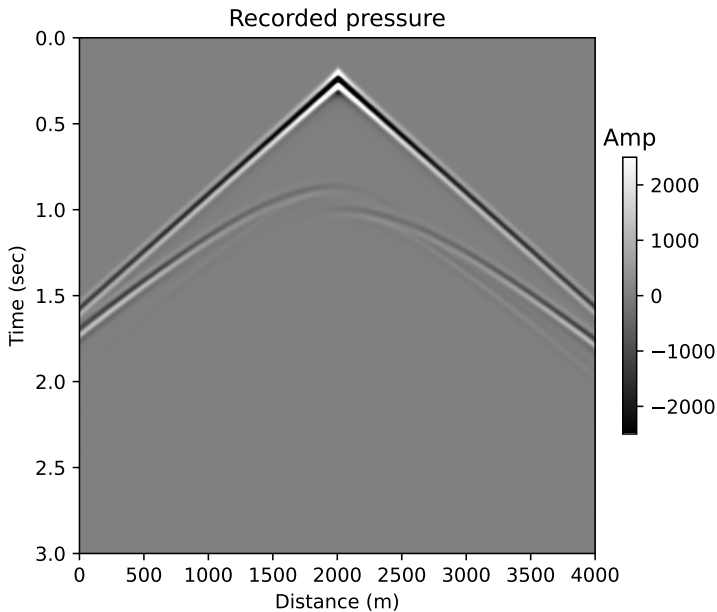
Diffracted waves

Movie-3

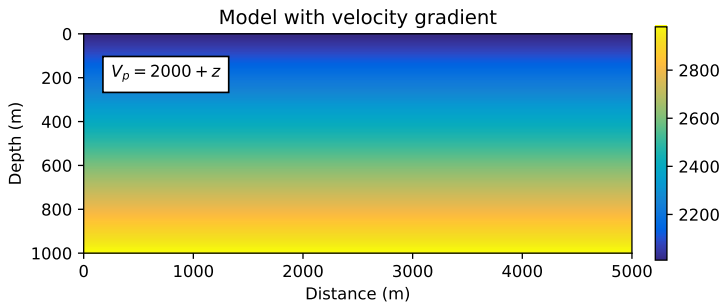
Diffracted waves



Diffracted waves



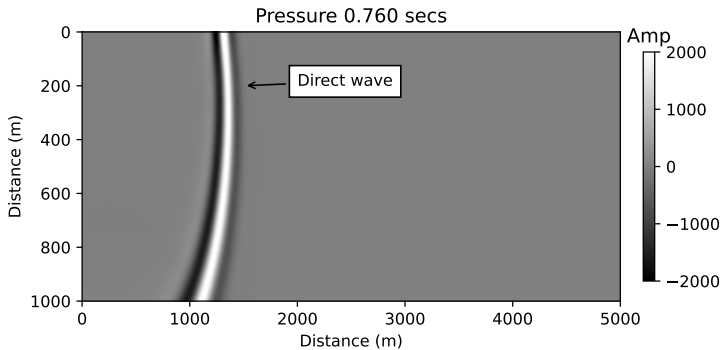
Diving waves



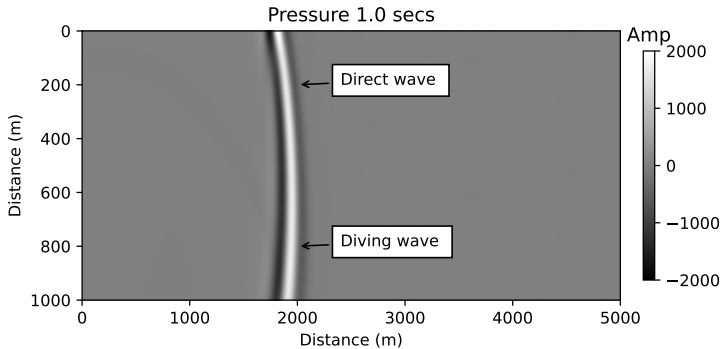
Diving waves

Movie-4

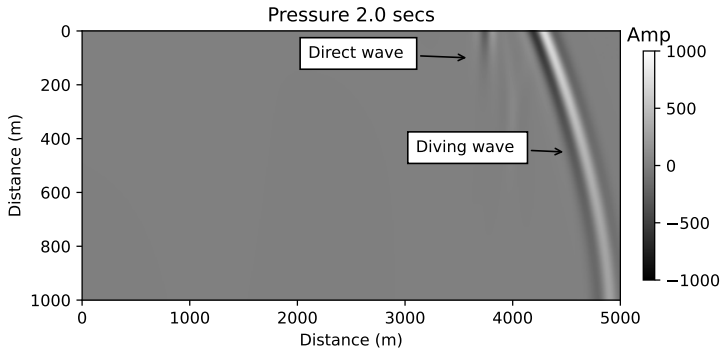
Diving waves



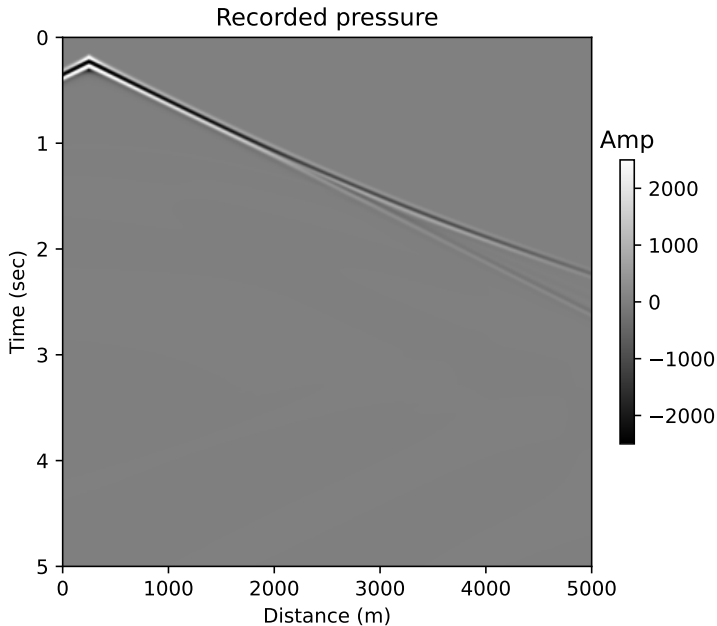
Diving waves



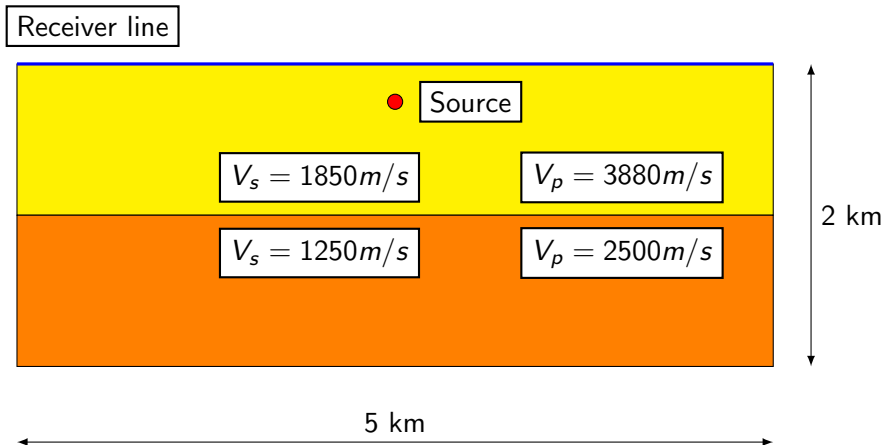
Diving waves



Diving waves



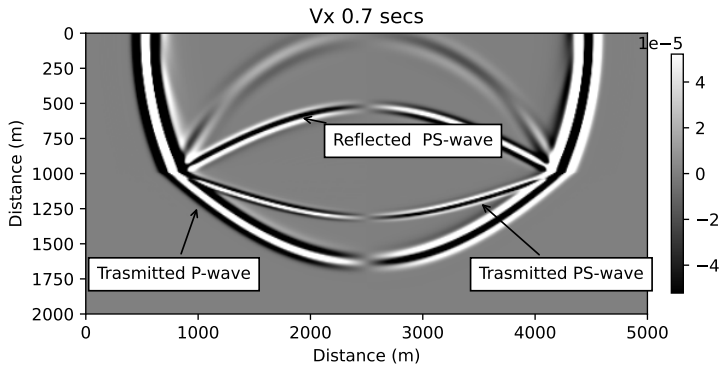
PS-waves



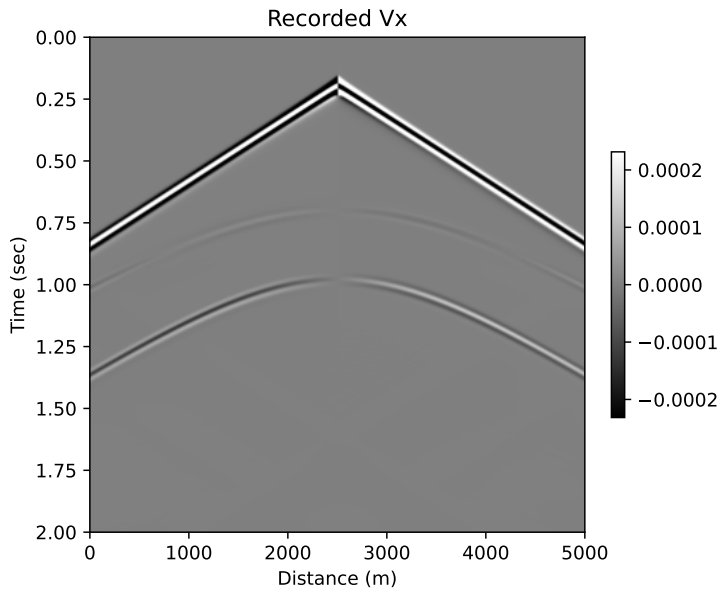
PS-waves v_x

Movie-5

PS-waves v_x



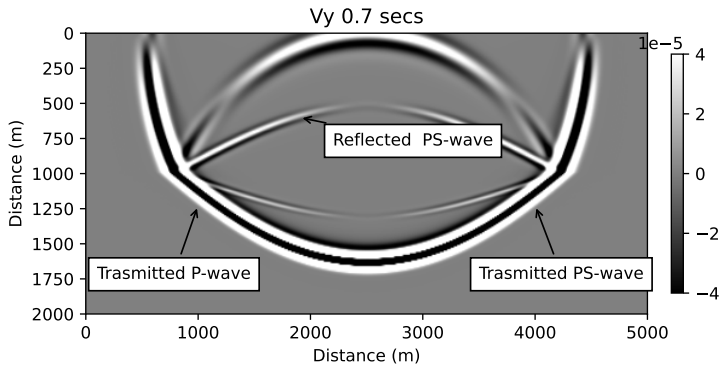
PS-waves v_x



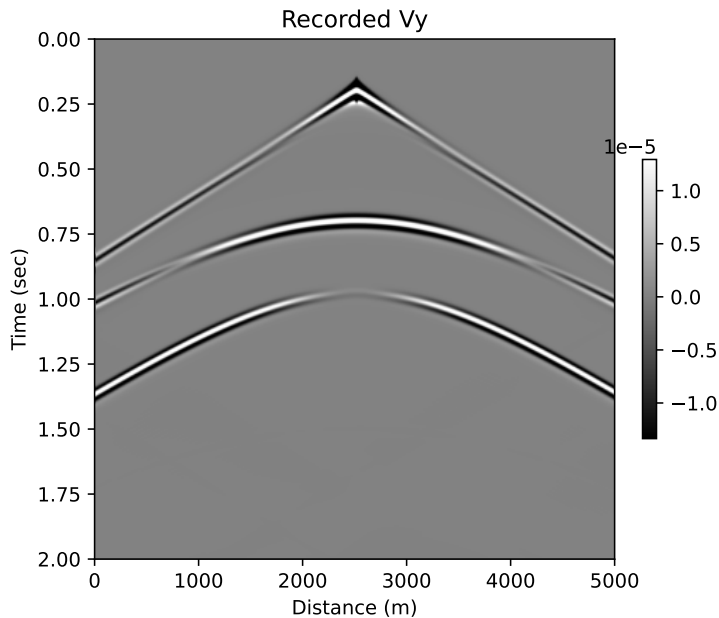
PS-waves v_y

Movie-6

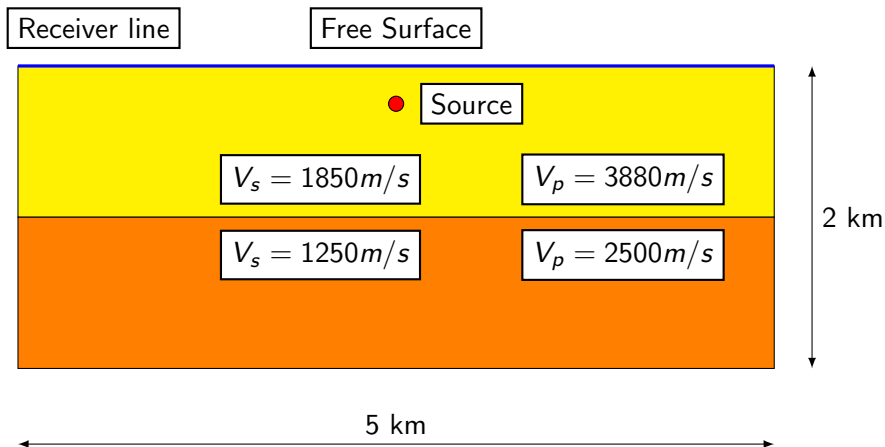
PS-waves v_y



PS-waves v_y



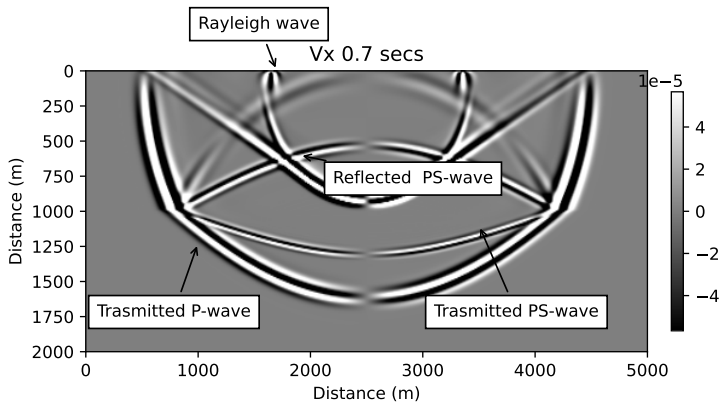
PS-waves Free surface



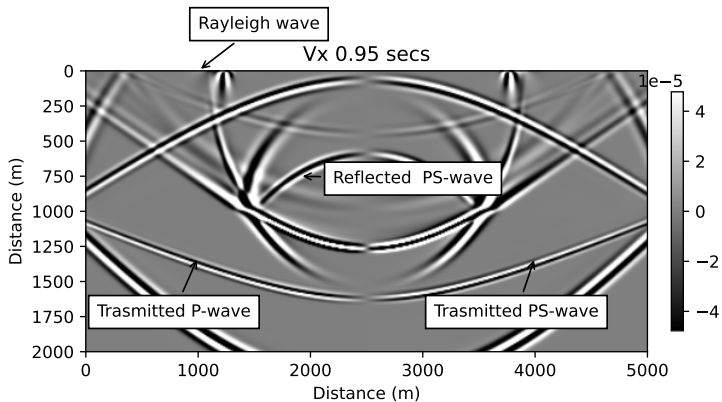
PS-waves Free surface v_x

Movie-7

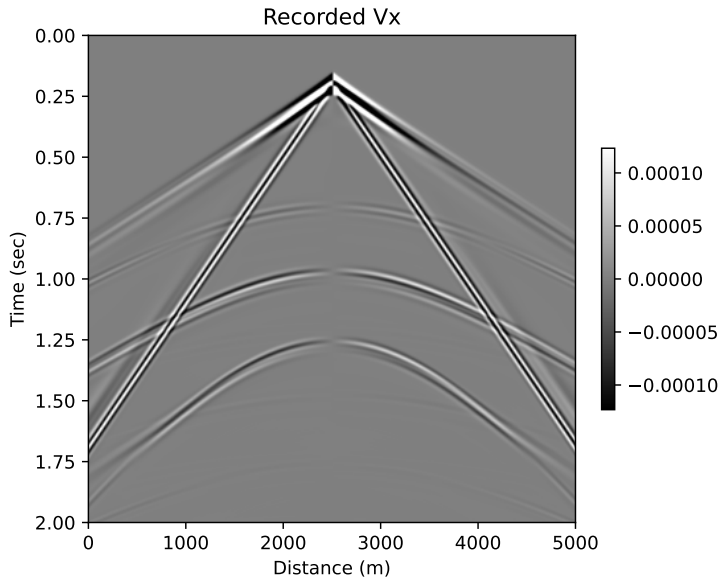
PS-waves Free surface v_x



PS-waves Free surface v_x



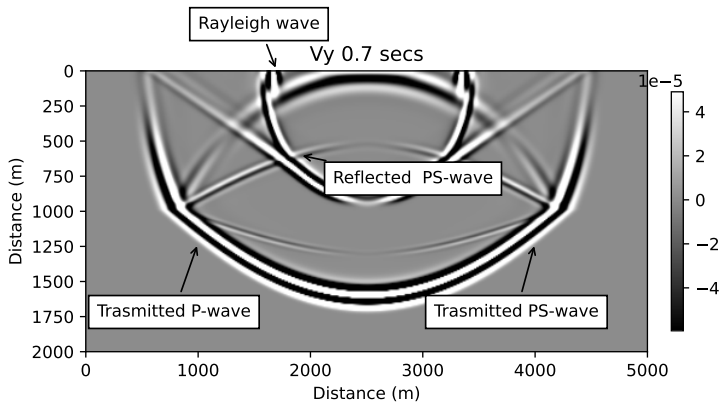
PS-waves Free surface v_x



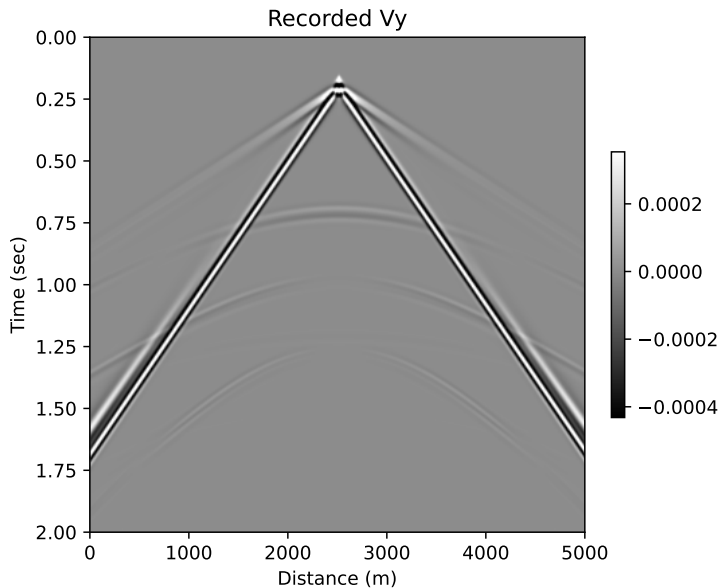
PS-waves Free surface v_y

Movie-8

PS-waves Free surface v_y



PS-waves Free surface v_y



Summary

- ▶ P-waves
- ▶ Reflected and Transmitted waves
- ▶ Refracted waves
- ▶ Head waves
- ▶ Diffractions
- ▶ Diving waves
- ▶ PS-waves
- ▶ Rayleigh waves (surface waves)