

5. The displacement field of an S wave with angular frequency ω propagating in the (x, z) -plane in a medium with shear wave velocity β is given by

$$\mathbf{u}(\mathbf{x}, t) = \mathbf{A} \sin(\omega t - \mathbf{k} \cdot \mathbf{x})$$

with $\mathbf{A} = (1, 1, -2)^T$.

- (a) Give the SH- and SV-components of $\mathbf{u}(\mathbf{x}, t)$.
- (b) Give a possible wavenumber vector \mathbf{k} of this wave.
6. A P-wave refraction experiment is carried out for a structure with two horizontal layers over a halfspace.
Make a sketch of the situation and indicate the layer velocities and thicknesses.
- (a) Give the travel times as a function of distance of the two(!) head waves in terms of distance, layer velocities and thicknesses. (That means expressions without incident angles. Full derivation, or simplification of the more complicated expressions is not required.)
- (b) How can one determine the velocities of the layers and halfspace from the measurements of this experiment?
- (c) How can one determine the thicknesses of first and second layer?
- (d) In which cases does this method give incorrect results? Explain your answer.

X, v_0, v_1, h_0