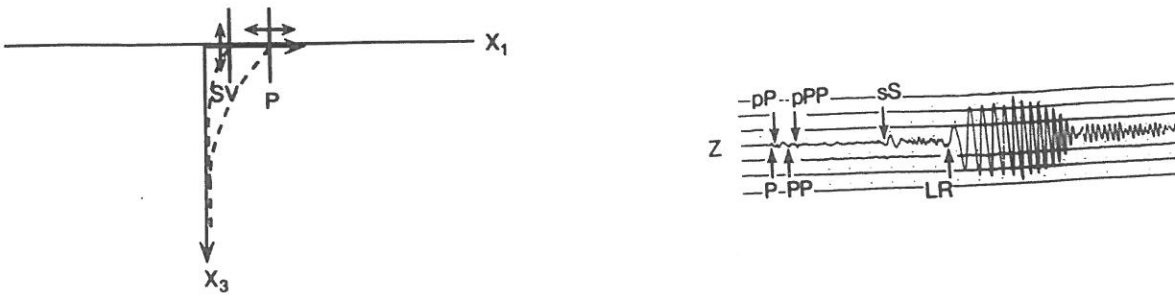


Rayleigh Waves



Simultaneous existence of evanescent P - and SV -wave energy traveling horizontally along a free surface produces the interference surface wave called a Rayleigh wave.

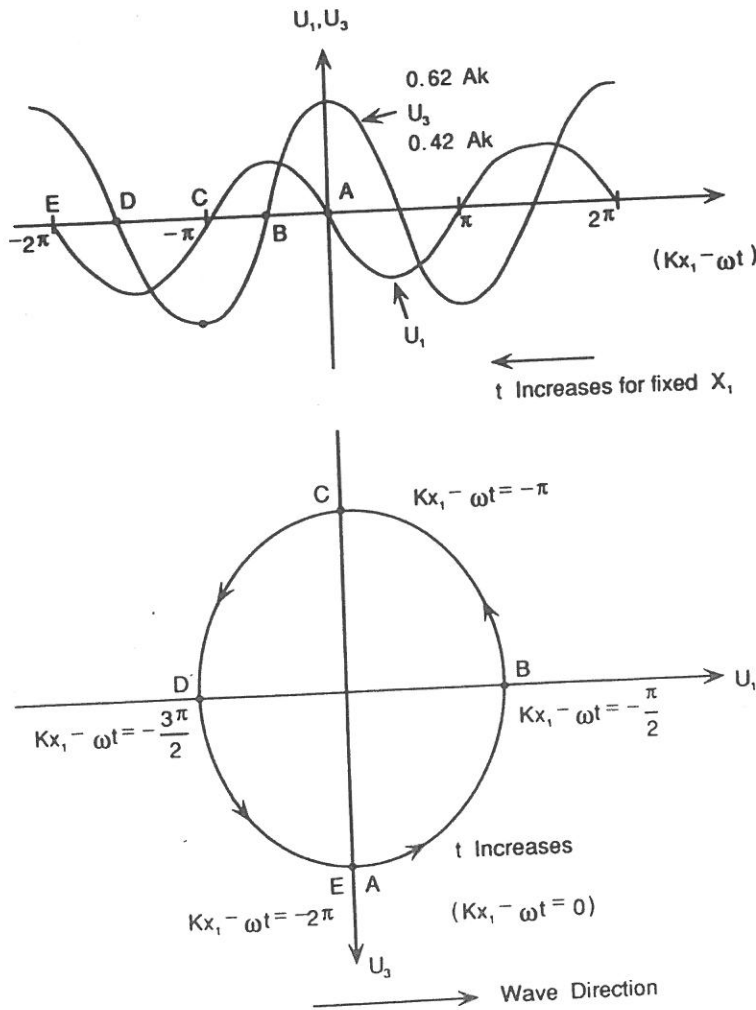


FIGURE 4.5 (Top) Plot of Eq. (4.27) as a function of the phase argument $(kx_1 - \omega t)$. (Bottom) Behavior of an individual particle as a function of time. The surface motion is retrograde elliptical.

$$u_1 = -0.42 Ak \sin(kx_1 - \omega t)$$

$$u_3 = 0.62 Ak \cos(kx_1 - \omega t)$$

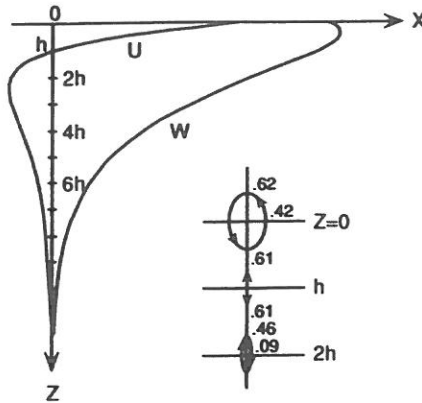
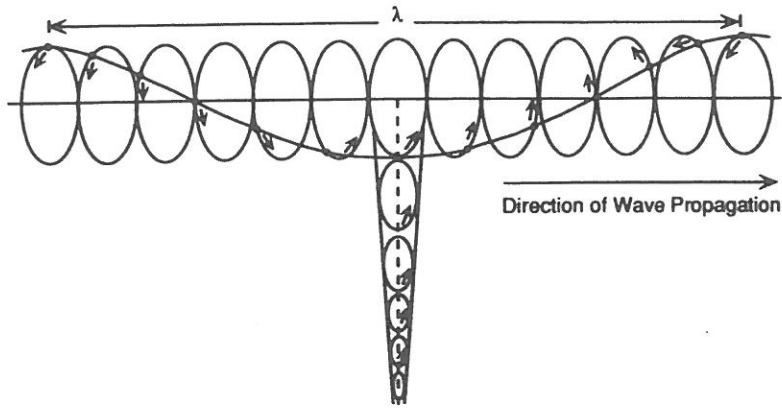


FIGURE 4.6 (Top) Rayleigh-wave particle motions over one wavelength along the surface and as a function of depth. (Bottom) Horizontal (u) and vertical (w) displacements of Rayleigh waves in a homogeneous half-space. The particle motion is retrograde elliptical above depth h and prograde elliptical at greater depth. (From Sheriff and Geldart, "Exploration Seismology," Vol. 1, History, theory, and acquisition. Copyright©1982. Reprinted with the permission of Cambridge University Press.)

Love Waves

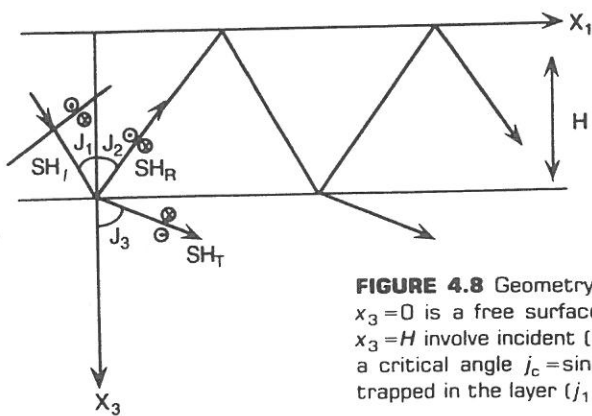
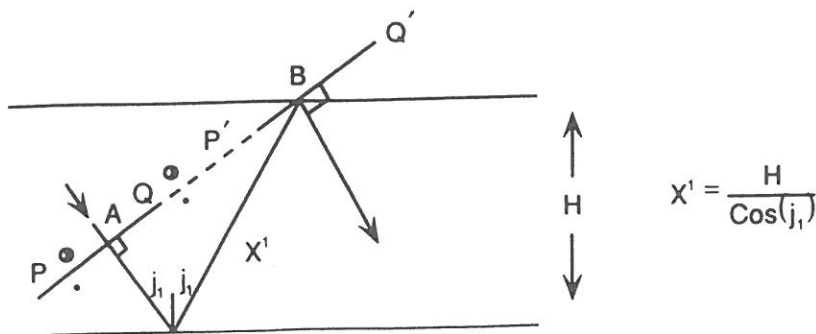


FIGURE 4.8 Geometry of SH waves that repeatedly reflect in a layer over a half-space. $x_3=0$ is a free surface, and the layer thickness is H . Interactions with the boundary of $x_3=H$ involve incident (SH_i), reflected (SH_r), and transmitted (SH_t) SH waves. For $\beta_1 < \beta_2$, a critical angle $j_c = \sin^{-1}(\beta_1/\beta_2)$ will exist beyond which SH reverberations will be totally trapped in the layer ($j_1 \geq j_c$).



seen in the horizontal and vertical components, respectively.
 In this particular case, the waves traveled along a mixed, oceanic and continental propagation path.

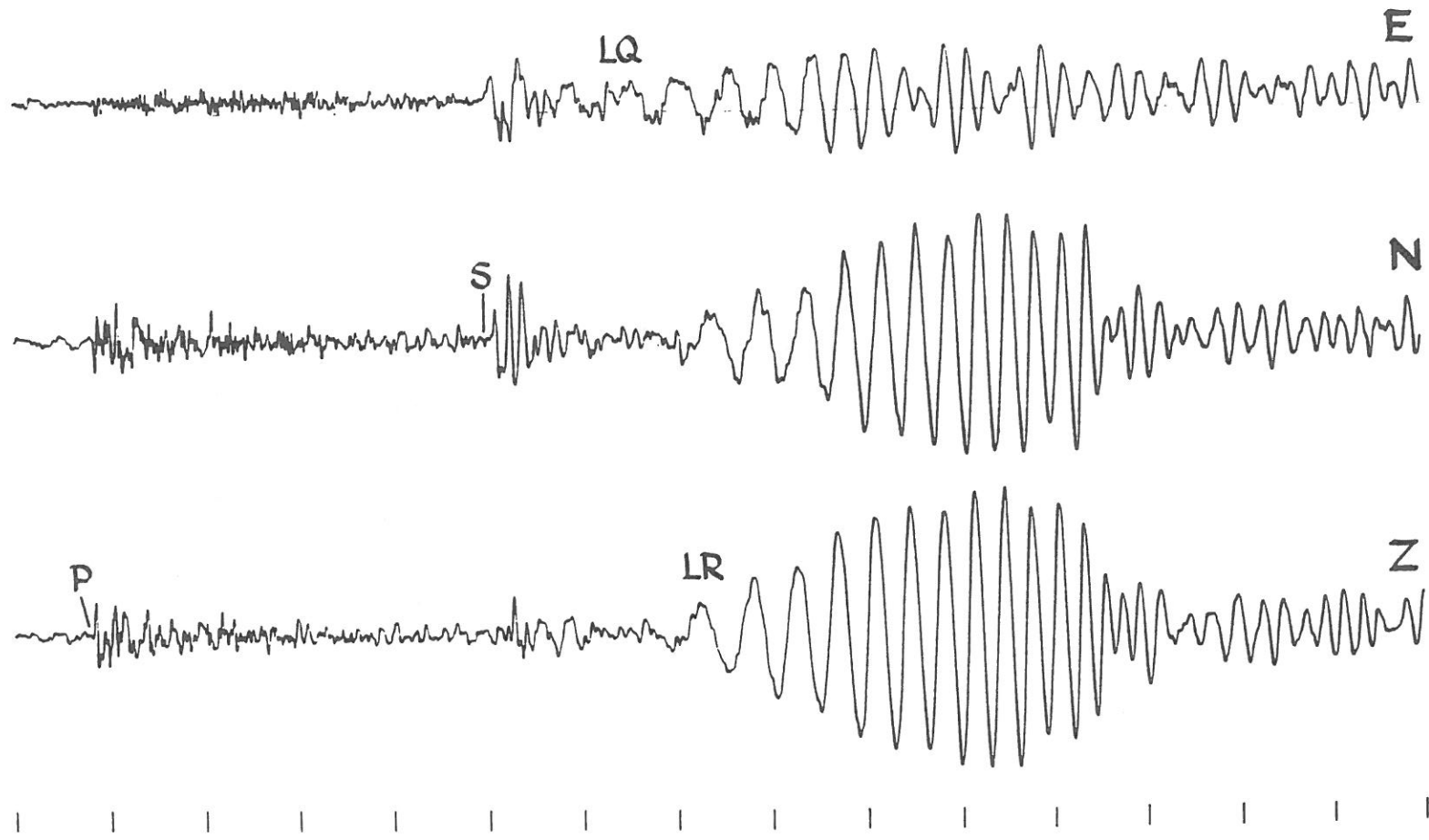


Plate 25. Broad-band three-component, displacement seismogram from the Norwegian Sea earthquake on July 27, 1976 ($m=5.1$, $h=9$ km). The records were made at GRF, Bayern, FRG, at an epicentral distance of 23° . All three channels show simple and clear patterns of P and S waves with distinct onsets as well as of dispersed surface waves. Note that while the vertical channel displays the Rayleigh wave train, Love waves, which precede the recorded LR by one minute or so, are well recorded on the E-W component. The strong surface waves indicate a shallow focus event. There is 1 minute between successive time marks at the bottom of the plate.

$\Delta = 23^\circ$

focus superficial.

teleseis
range

$10^\circ < \Delta < 105^\circ$