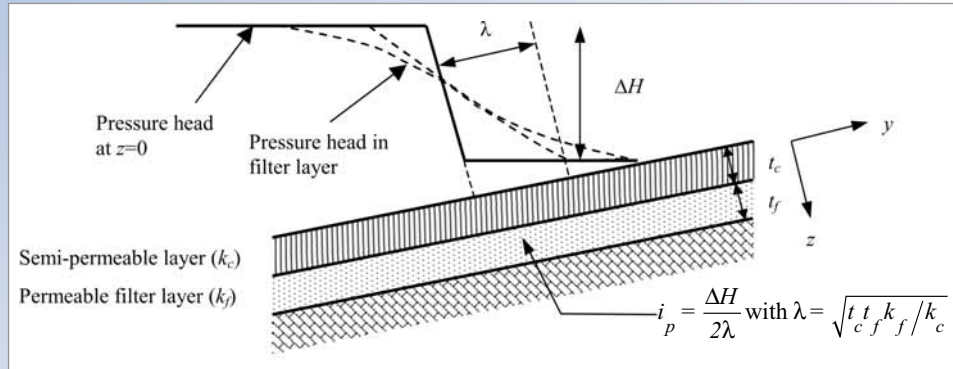


**Box 5.36** Quasi-stationary head distribution by waves on slope

The influence of a semi-permeable armourstone cover layer on top of a permeable filter layer, as used with revetments or bed protection under wave action, is illustrated in Figure 5.148. The response of the pressure head in the filter to the external pressure head distribution is a function of the leakage length,  $\lambda$  (m), which is defined in Equation 5.295 as:

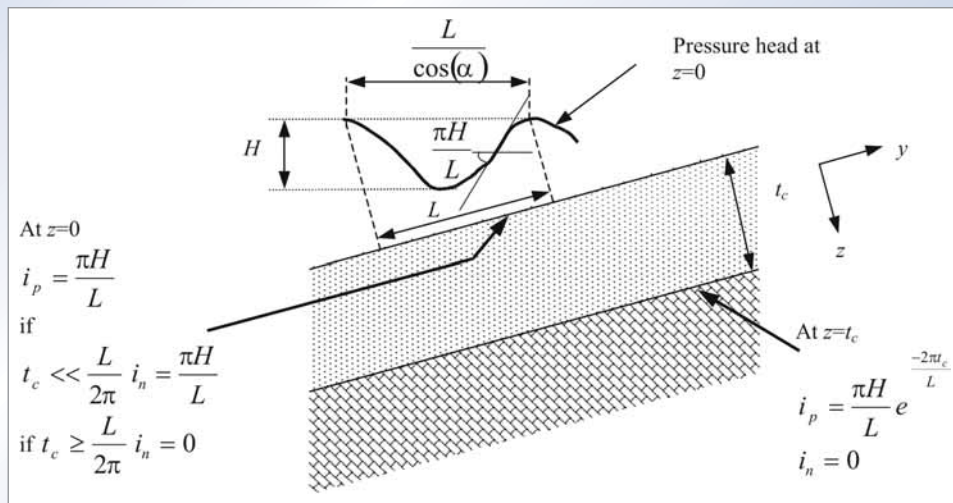
$$\lambda = \sqrt{t_c t_f k_f / k_c} \tag{5.295}$$

where  $t_f$  and  $t_c$  are the thickness of the filter and cover layer respectively (m);  $k_f$  = permeability of the filter layer parallel to the surface (m/s), and  $k_c$  = permeability of the cover layer perpendicular to the surface (m/s).



**Figure 5.148** Pressure head distribution in filter layer underneath a semi-permeable cover layer;  $i_p$  = hydraulic gradient in filter parallel to the surface/interface

The way the external pressure head penetrates into a (thick) armourstone cover layer is illustrated in Figure 5.149.



**Figure 5.149** Penetration of a head variation along the bed into a armourstone cover layer;  $i_n$  = hydraulic gradient in cover layer normal to the surface