Pressure below water waves.mcd

Based on "Hydrodynamics" lecture notes by MIT Prof. A.H. Techet

Equation 7.39 : Pressure (x,z,t) = [ρ.g.N(x, t) (g)].[$\frac{\cosh(k(z+H))}{\cosh(kH)}$] = [ρ.g.N(x, t)].[$\frac{\cosh[2\pi(z_\lambda + H_\lambda)]}{\cosh(2\pi.H_\lambda)}$]

Where λ = wave's wavelength   k = 2 π / λ   H = Total depth of water H_λ = H / λ   z = Depth in that water z_λ = z / λ

Equation's first term, ρ, g . N(x, t), is pressure variation at the base of the surface wave (i.e., at z = 0)

Second term scales pressure variation to depths below z = 0: $P_{scale}(z_\lambda, H_\lambda) := \frac{\cosh[2\pi(z_\lambda + H_\lambda)]}{\cosh(2\pi H_\lambda)}$

Truncating that scaling function at the sea bottom (i.e., at $z_\lambda = -H_\lambda$): $P_{truncated}(z_\lambda, H_\lambda) := (z_\lambda + H_\lambda > 0) P_{scale}(z_\lambda, H_\lambda)$