Gerstner Wave Equations

Horizontal Motion → $x' = x - \sum_{m=0}^{M-1} A_m cos\gamma_m sin\theta_m$

Vertical Motion → $y' = \sum_{m=0}^{M-1} A_m cos\theta_m$

Horizontal Motion → $z' = z - \sum_{m=0}^{M-1} A_m sin\gamma_m sin\theta_m$

$(x, y, z) = original\ vertex\ coordinates$

$(x', y', z') = displaced\ vertex\ coordinates$

$\theta_m = k_m cos\gamma_m x + k_m sin\gamma_m y - \omega_m t - \emptyset_m$

$A_m = Amplitude$

$\omega_m = \sqrt{g k_m}$

$\gamma_m = Wave\ propagation\ angle$

$t = time$

$k_m = Wave\ density$

$\emptyset_m = Wave\ phase\ shift$