$$y = \frac{1}{\sqrt{2\pi}} e^{-(x-\mu)^2/2\sigma}$$

$\mu =$ Mean
$\sigma =$ Standard Deviation
$\pi \approx 3.14159$
$e \approx 2.71828$

$$I_{i,k} = \frac{2\sqrt{\ln(2)}}{H_k} \exp\left[\frac{-4\ln(2)}{H_k^2}(2\theta_i-2\theta_k)^2\right]$$

Gaussian (G)

$$I_{i,k} = \frac{\sqrt{4}}{\pi H_k}\left[1+\frac{4(\sqrt{2}-1)}{H_k^2}(2\theta_i-2\theta_k)^2\right]^{-1}$$

Lorentzian (L)

$$f(x;x_0,\gamma) = \frac{1}{\pi\gamma\left[1+\left(\frac{x-x_0}{\gamma}\right)^2\right]} = \frac{1}{\pi}\left[\frac{\gamma}{(x-x_0)^2+\gamma^2}\right]$$

γ is the scale parameter which specifies the half-width at half-maximum (HWHM), alternatively 2γ is full width at half

$$I_{i,k} = \frac{\sqrt{[4(2^{3/2}-1)]}}{2\pi H_k}\left[1+\frac{4(2^{2/3}-1)}{H_k^2}(2\theta_i-2\theta_k)^2\right]^{-1.5}$$

Intermediate Lorentzian (IL)

$$I_{i,k} = \frac{2\sqrt{[4(\sqrt{2}-1)]}}{\pi H_k}\left[1+\frac{4(\sqrt{2}-1)}{H_k^2}(2\theta_i-2\theta_k)^2\right]^{-2}$$

Modified Lorentzian (ML)

$$I_{i,k} = \frac{2\sqrt{m}\,\Gamma(2^{1/m}-1)}{\pi\,\Gamma(m-0.5)\,H_k}\left[1+\frac{4(2^{1/m}-1)}{H_k^2}(2\theta_i-2\theta_k)^2\right]^{-m}$$

Pearson VII (PVII)

$$I_{i,k} = \beta_g^{-1}\,\mathrm{Re}\left[\Omega\left[\frac{\sqrt{\pi}}{\beta}|2\theta i-2\theta k| + i\,\frac{\beta_c^2}{\beta_g^2\,\pi}\right]\right]$$

Voigt (V)

$$I_{i,k} = \eta\, L_{i,k} + (1-\eta)\, G_{i,k}$$

pseudo-Voigt

Key: $I_{i,k}$, intensity at i^{th} point in pattern due to k^{th} line; $2\theta_k$, Bragg angle; H_k, full-width at half-maximum intensity; β_c & β_g, integral-breadths of Lorentzian and Gaussian components, respectively; η, mixing parameter; Ω, complex error function; Re, real part of function.