$$\phi_{\mathrm{I}} = (y - y_c)\left[1 + \sum_{n=1}^{\infty} A_n (y - y_c)^n\right]$$

$$\phi_{\mathrm{II}} = 1 + \sum_{n=1}^{\infty} B_n (y - y_c)^n - \frac{Q'(y_c)}{U'(y_c)}\phi_{\mathrm{I}} \log(y - y_c)$$