1.

$$V(r) = D_e(1 - \frac{u(r)}{u(r_e)} e^{\beta(r) y_p^{r_{eq}}(r)})^2 \tag{1}$$

2.

$$\beta(r) = (1 - y_p^{r_{ref}}(r)) \sum_{i=0}^{N_\beta} \beta_i y_q^{r_{ref}}(r)^i + y_p^{r_{ref}}(r) \beta_\infty \tag{2}$$

3.

$$y_n^{r_x}(r) = \frac{r^n - r_x^n}{r^n + r_x^n} \tag{3}$$

4.

$$\lim_{r \to \infty} \beta(r) \ = \beta_\infty \tag{4}$$