$$\phi(x+h\bar{b}(\alpha)\pm\sqrt{hd}\sigma_r^m) = \phi(x) + D\phi(x)\cdot(h\bar{b}(\alpha)\pm\sqrt{hd}\sigma_r^m)$$
$$+\frac{hd}{2}(\sigma_r^m)^T D^2\phi(x)\sigma_r^m \pm \sqrt{d}\,h^{\frac{3}{2}} b(\alpha)^T D^2\phi(x)\sigma_r^m + \frac{h^2}{2}\bar{b}(\alpha)^T D^2\phi(x)\bar{b}(\alpha)$$
$$[0.2cm] + \sum_{|\beta|=3}\frac{D^\beta\phi(x)}{\beta!}(h\bar{b}(\alpha)\pm\sqrt{hd}\,\sigma_r^m)^\beta + \sum_{|\beta|=4}\frac{D^\beta\phi(\xi_\pm)}{\beta!}(h\bar{b}(\alpha)\pm\sqrt{hd}\,\sigma_r^m)^\beta,$$