the scalar potential reads

$$V^{\rm smooth}(S,\Phi) = \kappa^2 \left| -M^2 + \frac{(\bar\Phi\Phi)^2}{M_{\rm P}^2} \right|^2 + \kappa^2 |S|^2 \frac{|\Phi|^2|\bar\Phi|^2}{M_{\rm P}^4} \left(|\Phi|^2 + |\bar\Phi|^2 \right) \ , \tag{232}$$

where we denote by the same letter the superfield and its scalar component ($\theta = 0$).

We remind the reader that $\bar\Phi$, Φ are 2 fields charged under $G_{\rm GUT}$. If we follow the original motivation, $G_{\rm GUT} = G_{\rm PS}$ and we want Φ to be non-trivially charged under the factors $SU(4)_{\rm C} \times SU(2)_{\rm R}$ in order to generate the breaking scheme $G_{\rm PS} \to G_{\rm SM}$. The simplest possibility to realize this is to assign Φ to the representation $(\mathbf{4},\mathbf{1},\mathbf{2})$. It is then necessary to assign $\bar\Phi$ to its complex conjugate representation $(\bar{\mathbf{4}},\mathbf{1},\mathbf{2})$ so that the superpotential is invariant under G, S being necessarily an absolute gauge singlet belongs to a hidden sector.

We can define two real scalar fields, s and ϕ, as being the relevant component of the representation of the S, Φ, $\bar\Phi$ fields such that the potential can be rewritten [68]

$$V^{\rm smooth}(s,\phi) = \kappa^2 \left(M^2 - \frac{\phi^4}{M_{\rm P}^2} \right)^2 + 2\kappa^2 s^2 \frac{\phi^6}{M_{\rm P}^4} \ . \tag{233}$$

This modifies the picture drastically, since now the valley $\phi = 0$ still represents a flat direction for s, but is also a local maximum in the ϕ direction. As a consequence, inflation will be realized for non-vanishing values of ϕ, which induces the symmetry breaking *during* inflation. The minimum of the potential at fixed s is indeed reached for

$$\phi^2 = \frac{4}{3}\frac{M^2\mu^2}{s^2} \ , \quad \text{for} \quad s \gg \mu M \ , \tag{234}$$

which correspond to the two symmetric minima of the potential.

Inside the inflationary trajectory described above, the effective one-field potential is $V(s) = \mu^4(1 - (2/27)\mu^2 M^2/s^4)$ in the limit $s \gg \mu M$, a form similar to mutated hybrid inflation. The predictions of the model have been studied in [63], assuming an embedding within SUSY GUTs, that is with a unification scale of 2×10^{16} GeV and a gauge coupling constant of ~ 0.7. The normalization to the COBE data imposes the mass scales of inflation is found lower than in the F-term case $\mu \simeq 9 \times 10^{14}$ GeV and the cutoff M scale is found close to the reduced Planck mass $M \sim M_{\rm P}$. The spectral index is then given by [63]

$$n_s \simeq 1 = \frac{5}{3N_Q} \simeq 0.97 \quad (\text{for} \ \ N_Q = 60) \ , \tag{235}$$