$$\underset{}{\text{minimize}} \quad M(t_f, \phi(t_f, u(t_f)|y_0, p)) + \int_0^{t_f} L(t, \phi(t, u(t)|y_{0,} p))$$

$s.t.$

$$\frac{dy}{dt} = f_j(t, \phi(t, u(t)|y_{0,} p), u(t)) \quad \forall t \in [0, t_f], \ \forall j \in \mathbb{Z}_{[1, f_n]}$$
$$g_j(t, \phi(t, u(t)|y_{0,} p), u(t)) = 0 \quad \forall t \in [0, t_f], \ \forall j \in \mathbb{Z}_{[1, g_n]}$$
$$h_j(t, \phi(t, u(t)|y_{0,} p), u(t)) + s_j = 0 \quad \forall t \in [0, t_f], \ \forall j \in \mathbb{Z}_{[1, h_n]}$$

$$u_{min} \leqslant u(t) \leqslant u_{max} \quad \forall t \in [0, t_f]$$
$$y_{min} \leqslant y(t) \leqslant y_{max} \quad \forall t \in [0, t_f]$$
$$0 \leqslant s_j \leqslant \infty \quad \forall t \in [0, t_f], \ \forall j \in \mathbb{Z}_{[1, h_n]}$$

$$y \in \mathbb{R}_{[1,n]}, \ u \in \mathbb{R}_{[1,m]}$$