$$\mathcal{H} = V + \lambda' f + \lambda_{n+1}\left[g^2 H(g) \right]$$

$$g \geq 0$$

№1

$$\dot{x}_1 = x_2$$

$$\dot{x}_2 = u \quad \text{огр. элем}$$

$$\int_{t_0}^{t_f} \frac{1}{2}(x_1^2 + u^2)\,dt$$

$$|x_2| \leq 3 \qquad g_1 = 3 + x_2$$

$$|u| = 1 \qquad g_2 = 3 - x_2$$

$$\mathcal{H} = \frac{1}{2}(x_1^2 + u^2) + \lambda_1 x_2 + \lambda_2 u + \lambda_3 \left\{ (3+x_2)^2 \cdot H(3+x_2) + (3-x_2)^2 \cdot H(3-x_2) \right.$$

$$g \geq 0$$

$$\begin{cases} \dot{x}_1 = x_2 \\ \dot{x}_2 = u \\ \dot{x}_3 = (3+x_2)^2 \cdot H(3+x_2) \\ \dot{\lambda}_1 = -x_1 \\ \dot{\lambda}_2 = -\lambda_1 - \lambda_3 (6+2x_2)\cdot H(3+x_2) + \\ \qquad + 2(3-x_2)\cdot H(3-x_2) \\ \dot{\lambda}_3 = -\frac{\partial \mathcal{H}}{\partial x_3} = \end{cases}$$

$$\frac{\partial \mathcal{H}}{\partial u} = u + \lambda_2 = 0 \qquad u^* = -\lambda_2$$

$$\underbrace{H(x^*, \lambda^*, u^*) \le H(x^*, \lambda^*, u)}_{\text{при огранич. упр.}}$$

(1)

$$\begin{cases} \frac{1}{2}(u^*)^2 + 2\lambda_2 u^* \le \frac{1}{2}u^2 + \lambda_2 u \\ u^* = -\lambda_2 \\ -1 \le u \le 1 \end{cases}$$

$\frac{1}{2}\lambda_2^2 - 2\lambda_2^2 \le \frac{1}{2}4^2 + \lambda_2 4$

$-\frac{3}{2}\lambda_2^2 \le (1).$

$-\frac{3}{2}\lambda_2^2 \le \frac{1}{2} - \lambda_2$

$-\frac{5}{2}\lambda_2 \le \frac{1}{2}$

$\lambda_2 \geq \frac{2}{10}$

$$u^*(t) = \begin{cases} -1, & \lambda_2 \geq 0{,}2 \\ & \end{cases}$$