

517.927

[1-3]

[4],

$$\frac{dx}{dt} = f(t, x), \tag{1}$$

$$\alpha x(0) + \beta x(T) = \gamma. \tag{2}$$

$t \in [0; T]; a, b \in C_{R_m}[0; T], f : D = [0; T] \times [a; b] \rightarrow C_{R_m}[0; T]; \gamma - m -$   
 $\beta - m \times m.$

$$\alpha + \beta - (\alpha + \beta)^{-1} \alpha \geq \theta, (\alpha + \beta)^{-1} \beta \geq \theta, \tag{1), (2)}$$

$$\Lambda[\varphi(t); \psi(t)] = (\alpha + \beta)^{-1} \alpha \int_0^t \varphi(s) ds + (\alpha + \beta)^{-1} \beta \int_T^t \psi(s) ds.$$

: 1)  $f(t, x)$ ; 2)  
 $G(t, y, z) = \{g_{ij}(t, y, z)\}, \alpha(t, y, z) = \{\alpha_{ij}(t, y, z)\}, A(t, y, z) = \{a_{ij}(t, y, z)\}, (i, j = \overline{1, m})$   
 $y, z \in [a, b], t \in [0, T]$   
 $y \leq z (t \in [0, T], x, y, z \in [a, b])$

3)  $(G(t, y, z) + \alpha(t, y, z) - A(t, z, y))(z - y) \leq f(t, z) - f(t, y);$

$$p \geq \Lambda[G(t, y, z)p; -(G(t, y, z) + \alpha(t, y, z))p],$$

$$p \geq \Lambda[(G(t, y, z) + \alpha(t, y, z))p; -G(t, y, z)p]$$

$$y \leq z, t \in [0; T], y, z \in [a; b] \quad p \geq \theta.$$

1. 1)-3)

$$\begin{cases} y_{n+1} = \Lambda[G(t, y_n, z_n)(y_{n+1} - y_n) + A(t, z_n, y_n)(y_n - z_n) + \\ + f(t, y_n); (G(t, y_n, z_n) + \alpha(t, y_n, z_n))(z_{n+1} - z_n) + \\ + A(t, z_n, y_n)(z_n - y_n) + f(t, z_n)] + (\alpha + \beta)^{-1} \gamma; \\ z_{n+1} = \Lambda[(G(t, y_n, z_n) + \alpha(t, y_n, z_n))(z_{n+1} - z_n) + \\ A(t, z_n, y_n)(z_n - y_n) + f(t, z_n); G(t, y_n, z_n)(y_{n+1} - y_n) + \\ + A(t, z_n, y_n)(y_n - z_n) + f(t, y_n)] + (\alpha + \beta)^{-1} \gamma; \end{cases} \quad (3)$$

$$n = 0, 1, 2, \dots, y_0 = a, \quad z_0 = b, \quad \emptyset .$$

$$\emptyset \quad x^* \in [a; b] \quad (1), (2)$$

$$y_0 \leq y_1 \leq x^* \leq z_1 \leq z_0$$

$$y_n \leq y_{n+1} \leq x^* \leq z_{n+1} \leq z_n. \quad (4)$$

$$\Lambda[\varphi(t), \psi(t)] = L^+[\varphi(t)] - L^-[\psi(t)],$$

$$L^+[\varphi(t)] = (\alpha + \beta)^{-1} \alpha \int_0^t \varphi(s) ds, \quad L^-[\psi(t)] = -(\alpha + \beta)^{-1} \beta \int_T^t \psi(s) ds$$

$$\begin{aligned} F_1(t, u, v, y, z) &= G(t, y, z)(u - y) + A(t, z, y)(y - z) + f(t, y), \\ F_2(t, u, v, y, z) &= (G(t, y, z) + \alpha(t, y, z))(v - z) + \\ &\quad + A(t, z, y)(z - y) + f(t, z), \end{aligned}$$

$$\underline{y} \leq \underline{u} \leq \underline{v} \leq \underline{z}, \quad \bar{y} \leq \bar{y} \leq \bar{z} \leq \bar{z}$$

$$\begin{aligned} F_1(t, \bar{u}, \bar{v}, \bar{y}, \bar{z}) - F_1(t, \underline{u}, \underline{v}, \underline{y}, \underline{z}) &= G(t, \bar{y}, \bar{z})(\bar{u} - \bar{y}) + A(t, \bar{z}, \bar{y})(\bar{y} - \bar{z}) + \\ + f(t, \bar{y}) - G(t, \underline{y}, \underline{z})(\underline{u} - \underline{y}) - A(t, \underline{z}, \underline{y})(\underline{y} - \underline{z}) - f(t, \underline{y}) &\geq G(t, \bar{y}, \bar{z}) \times \\ \times (\bar{u} - \underline{u}) - G(t, \underline{y}, \underline{z})(\underline{u} - \underline{y}) + A(t, \bar{z}, \bar{y})(\bar{y} - \bar{z}) - A(t, \underline{z}, \underline{y})(\underline{y} - \underline{z}) + \\ + (G(t, \underline{y}, \bar{y}) + \alpha(t, \underline{y}, \bar{y}) - A(t, \bar{y}, \underline{y}))(\bar{y} - \underline{y}) &\geq G(t, \bar{y}, \bar{z})(\bar{u} - \underline{u}) + \\ + (G(t, \underline{y}, \bar{y}) - G(t, \underline{y}, \underline{z}))(\bar{y} - \underline{y}) + \alpha(t, \underline{y}, \bar{y})(\bar{y} - \underline{y}) + A(t, \underline{z}, \underline{y})(\underline{z} - \bar{z}) &\geq \\ \geq G(t, \bar{y}, \bar{z})(\bar{u} - \underline{u}) \end{aligned}$$

$$\begin{aligned} F_2(t, \underline{u}, \underline{v}, \underline{y}, \underline{z}) - F_2(t, \bar{u}, \bar{v}, \bar{y}, \bar{z}) &= (G(t, \underline{y}, \underline{z}) + \alpha(t, \underline{y}, \underline{z}))(\underline{v} - \underline{z}) + \\ + A(t, \underline{z}, \underline{y})(\underline{z} - \underline{y}) + f(t, \underline{z}) - (G(t, \bar{y}, \bar{z}) + \alpha(t, \bar{y}, \bar{z}))(\bar{v} - \bar{z}) - A(t, \bar{z}, \bar{y}) &\times \\ \times (\bar{z} - \bar{y}) - f(t, \bar{z}) &\geq (G(t, \underline{y}, \underline{z}) + \alpha(t, \underline{y}, \underline{z}))(\underline{v} - \underline{z}) - (G(t, \bar{y}, \bar{z}) + \\ + \alpha(t, \bar{y}, \bar{z}))(\bar{v} - \bar{z}) + A(t, \underline{z}, \underline{y})(\underline{z} - \underline{y}) - A(t, \bar{z}, \bar{y})(\bar{z} - \bar{y}) + (G(t, \bar{z}, \underline{z}) + \\ + \alpha(t, \bar{z}, \underline{z}) - A(t, \underline{z}, \bar{z}))(\underline{z} - \bar{z}) &\geq (G(t, \bar{y}, \bar{z}) + \alpha(t, \bar{y}, \bar{z}))(\underline{v} - \bar{v}) + \\ + (G(t, \bar{z}, \underline{z}) - G(t, \underline{y}, \underline{z}))(\underline{z} - \bar{z}) + (\alpha(t, \bar{z}, \underline{z}) - \alpha(t, \underline{y}, \underline{z}))(\underline{z} - \bar{z}) \\ + \alpha(t, \bar{z}, \underline{z})(\underline{z} - \bar{z}) + A(t, \underline{z}, \underline{y})(\bar{y} - \underline{y}) &\geq (G(t, \bar{y}, \bar{z}) + \alpha(t, \bar{y}, \bar{z}))(\underline{v} - \bar{v}). \end{aligned}$$

33.4 [3] ( . [3] . 450).

$$4) \quad \beta(t, y, z) = \{\beta_{ij}(t, y, z)\}, \quad (i, j = \overline{1, m})$$

$$y \quad z \quad y, z \in [a, b], \quad t \in [0, T]$$

$$y \leq z \quad t \in [0, T], \quad x, y, z \in [a, b]$$

$$f(t, z) - f(t, y) \leq (G(t, y, z) + \beta(t, y, z) - A(t, z, y))(z - y),$$

$$G(t, y, z), A(t, y, z)$$

$$D \quad 1)-5),$$

$$3).$$

$$z_{n+1} - y_{n+1}$$

$$5)$$

$$\begin{aligned} z_{n+1} - y_{n+1} &= \Lambda[(G(t, y_n, z_n) + \alpha(t, y_n, z_n))(z_{n+1} - z_n); G(t, y_n, z_n)] \times + \\ &\times (y_{n+1} - y_n) + \Lambda[A(t, z_n, y_n)(z_n - y_n); A(t, z_n, y_n)(y_n - z_n)] + \\ &+ \Lambda[f(t, z_n); f(t, y_n)] - \Lambda[f(t, y_n); f(t, z_n)] - \Lambda[G(t, y_n, z_n) \times \\ &\times (y_{n+1} - y_n); (G(t, y_n, z_n) + \alpha(t, y_n, z_n))(z_{n+1} - z_n)] - \Lambda[A(t, z_n, y_n) \times \\ &\times (y_n - z_n); A(t, z_n, y_n)(z_n - y_n)] \leq \Lambda[G(t, y_n, z_n)(z_{n+1} - y_{n+1}); G(t, y_n, z_n) \times \\ &\times (y_{n+1} - z_{n+1})] - \Lambda[G(t, y_n, z_n)(z_n - y_n); G(t, y_n, z_n)(y_n - z_n)] + \\ &+ \Lambda[\alpha(t, y_n, z_n)(z_{n+1} - z_n); \alpha(t, y_n, z_n)(z_{n+1} - z_n)] + 2\Lambda[A(t, z_n, y_n) \times \\ &\times (z_n - y_n); A(t, z_n, y_n)(y_n - z_n)] + \Lambda[(G(t, y_n, z_n) + \beta(t, y_n, z_n) - \\ &- A(t, z_n, y_n))(z_n - y_n)(G(t, y_n, z_n) + \beta(t, y_n, z_n) - A(t, z_n, y_n))(y_n - z_n)] \leq \\ &\leq \Lambda[(A(t, z_n, y_n) + \beta(t, y_n, z_n))(z_n - y_n); (A(t, z_n, y_n) + \beta(t, y_n, z_n)) \times \\ &\times (y_n - z_n)] + \Lambda[G(t, y_n, z_n)(z_{n+1} - y_{n+1}); G(t, y_n, z_n)(y_{n+1} - z_{n+1})] \end{aligned}$$

$$G = \{g_{ij}\}, \quad A = \{a_{ij}\}, \quad B = \{b_{ij}\} \quad \text{ó}$$

$$g_{ij} = \max_{\substack{t \in [0, T] \\ y, z \in [a, b]}} |g_{ij}(t, y, z)|,$$

$$a_{ij} = \max_{\substack{t \in [0, T] \\ y, z \in [a, b]}} |a_{ij}(t, y, z)|,$$

$$b_{ij} = \max_{\substack{t \in [0, T] \\ y, z \in [a, b]}} |\beta_{ij}(t, y, z)|.$$

$$(E - GT)^{-1} \geq \Theta$$

$$\|z_{n+1} - y_{n+1}\| \leq \|(E - GT)^{-1}T(A + B)\| \cdot \|z_n - y_n\|. \quad (5)$$

$$\begin{aligned} \mathbf{2.} \quad & D \quad 1)-4); \quad (3) \\ n = 0, 1, 2, \dots, \quad & x_0 = a, \quad z_0 = b \quad \phi, \quad y_0 \leq y_1 \leq z_1 \leq z_0; \end{aligned}$$

$$(E - GT)^{-1} \quad \|\mathcal{Q}\| \leq q < 1,$$

$$Q = (E - GT)^{-1}T(A + B). \quad [a, b] \quad \phi \quad x^* \quad (1), (2),$$

$$(3), \quad t \in [0; T] \quad \{y_n\}, \quad \{z_n\} \quad \phi$$

$$(4).$$

$$G(t, y, z)w, \quad \alpha(t, y, z)w, \quad A_k(t, y, z)w,$$

$$\beta(t, y, z)w, \quad 1 \quad y^* = \lim_{n \rightarrow \infty} y_n, \quad z^* = \lim_{n \rightarrow \infty} z_n.$$

$$\begin{aligned} y^* &= \Lambda[G(t, y^*, z^*)(y^* - y^*); (G(t, y^*, z^*) + \alpha(t, y^*, z^*))(z^* - z^*)] + \\ &+ \Lambda[A(t, z^*, y^*)(y^* - z^*); A(t, z^*, y^*)(z^* - y^*)] + \Lambda[f(t, y^*); f(t, z^*)] + \\ &+ (\alpha + \beta)^{-1}\gamma = \Lambda[A(t, z^*, y^*)(y^* - z^*); A(t, z^*, y^*)(z^* - y^*)] + \\ &+ \Lambda[f(t, y^*); f(t, z^*)] + (\alpha + \beta)^{-1}\gamma. \\ z^* &= \Lambda[A(t, z^*, y^*)(z^* - y^*); A(t, z^*, y^*)(y^* - z^*)] + \\ &+ \Lambda[f(t, z^*); f(t, y^*)] + (\alpha + \beta)^{-1}\gamma \end{aligned}$$

$$(5)$$

$$\|z_{n+1} - y_{n+1}\| \leq q \|z_n - y_n\|,$$

$$\|z_{n+1} - y_{n+1}\| \leq q^{n+1} \|z_0 - y_0\|, \quad (4),$$

$$\lim_{n \rightarrow \infty} z_n = \lim_{n \rightarrow \infty} y_n, \quad y^* = z^* = x^*.$$

$$x^* = (\alpha + \beta)^{-1} \gamma - (\alpha + \beta)^{-1} \alpha \int_0^t f(s, x^*) ds + (\alpha + \beta)^{-1} \beta \int_T^t f(s, x^*) ds$$

,  $x^*$  ó  $\emptyset$  , (1), (2).

$$\alpha_{ij}(t, y, z) \quad \beta_{ij}(t, y, z) \quad (i, j = \overline{1, m}, t \in [0; T])$$

$$\alpha_{ij}(t, y, z) \leq a_{ij}^{(0)}(z - y),$$

$$\beta_{ij}(t, y, z) \leq b_{ij}^{(0)}(z - y)$$

$$\|Q_0\| \leq q_0 < 1, \quad Q_0 = (E - GT)^{-1}(A_0 + B_0)T, \quad A_0 = \{a_{ij}^{(0)}\}, \quad B_0 = \{b_{ij}^{(0)}\},$$

(3) , (5)

$$\|z_{n+1} - y_{n+1}\| \leq \|(E - GT)^{-1}(A_0 + B_0)T\| \|z_n - y_n\|^2 \leq q_0 \|z_n - y_n\|^2.$$

(5),

,  $\emptyset$  , , ,

1. . . . . ó 1980. ó 268 . . . . . ó

2. . . . . // . 1. ó : - . . . . . ó 1981. ó . 68673.

3. . . . . / . . . . . , 2007. ó 516 . . . . .

4. . . . . . . . . . . ó : . . . . . , 1992. ó 277 .