

$$\begin{array}{l} (S) \\ x_i = \\ a + \\ ih \\ i \in \\ [0, n+ \\ 1] \\ h = \\ b - an + 1 \\ (S) \begin{cases} -u'' + p(x)u + q(x)u = g(x)x \in [a, b] \\ u(a) = \alpha \\ u(b) = \beta \end{cases} \begin{matrix} p, q, g \in C^0([a, b]) \\ q \geq 0em[a, b] \end{matrix} \\ u_i \\ u(x_i) \\ U = \\ (u_1, \dots, u_n)^T \\ u_0 = \\ Q_{n+1} = \\ \beta \\ u''(x_i) \\ u'(x_i) \\ y_i \\ ?? \\ f(x) \\ x_i \end{array}$$

$$f(x_i)=\sum_{n=0}^{\infty}f^{(n)}(x_i)n!(x-x_i)^n=f(x_i)+f'(x_i)(x-x_i)1!+f''(x_i)(x-x_i)^22!+\ldots.$$

$$(1) \begin{array}{l} y_i \\ ?? \end{array}$$

$$(2) \quad u(x)=u(x_i)+u'(x_i)(x-x_i)+u''(x_i)2!(x-x_i)^2+\ldots.$$

$$(2) \begin{array}{l} y_i \\ x_i = \\ x_{i-1} \\ x_{i+1} \\ ?? \\ ?? \end{array}$$

$$(3) \quad u(x_{i-1})=u(x_i-h)=u(x_i)-hu'(x_i)+h^2u''(x_i)2!-h^3u^{(3)}(x_i)3!+O(h^4)$$

$$(4) \quad u(x_{i+1})=u(x_i+h)=u(x_i)+hu'(x_i)+h^2u''(x_i)2!+h^3u^{(3)}(x_i)3!+O(h^4) \\ ?? \\ ??$$

$$(5) \quad u(x_{i+1})-u(x_{i-1})2h=u'(x_i)+O(h^2)$$

$$(6) \quad u(x_{i+1})-2u(x_i)+u(x_{i-1})h^2=u''(x_i)+O(h^2) \\ ?? \\ ?? \\ (\dot{S})$$

$$(7) \quad u(x_{i+1})-2u(x_i)+u(x_{i-1})h^2+p(x_i)u(x_{i+1})-u(x_{i-1})2h+q(x_i)u(x_i)-g(x_i)=e_i$$

$$\begin{array}{l} i = \\ e_i = \\ O(h^2) \\ p_i = \\ p(x_i) \\ q_i = \\ q(x_i) \\ g_i = \\ g(x_i) \\ (S) \\ (S) \begin{cases} -u_{i+1} + 2u_i - u_{i-1}h^2 + p_iu_{i+1} - u_{i-1}2h + q_iu_i - g_i = 0 \\ u_0 = \alpha \\ u_{n+1} = \beta \end{cases} \quad i = 1, \dots, n \\ (S) \\ y \\ M_nR \\ u_1, u_2, \dots, u_n)^T \\ \subseteq \\ R^n \\ 2q_1 - \\ 1 + \\ h2p_1 \dots\dots\dots 0 \\ - \end{array}$$