

$$\begin{array}{l} (1) \quad u_t = F(u,x,t,u_x,u_{xx}) \\ u(x,0) = \\ g(x) \\ g(x) \\ x \end{array}$$

$$\begin{array}{l} u_t = x^2 + \frac{1}{4}u_x^2 \\ (2) \quad u(x,0) = \\ 0 \\ x_1,x_2,\ldots,x_N \end{array}$$

$$u_t(x_i,t)=x_i^2+\frac{1}{4}\left[\sum_{j=1}^Na_{ij}u(x_j,t)\right]^2, i=1,2,\ldots,N$$

$$\begin{array}{l} (3) \quad N \\ t \\ t_0,t_1,\ldots,t_M \\ h \\ t_{k+1}= \\ t_k+ \\ h \\ \mathbf{u}_k=\langle u(x_1,t_k),u(x_2,t_k),\ldots,u(x_N,t_k)\rangle^T,k=0,1,2,\ldots,M \end{array}$$

$$\mathbf{x}=\langle x_1,x_2,\ldots,x_N\rangle^T$$

$$G(t,\mathbf{u})=\mathbf{x}\cdot\mathbf{x}+\frac{1}{4}(A\mathbf{u})\cdot(A\mathbf{u})$$

$$\bar{A}_{ij}$$

$$\begin{array}{l} \mathbf{u}_{k+1}=\mathbf{u}_k+\frac{k}{6}(\mathbf{k}_1+2\mathbf{k}_2+2\mathbf{k}_3+\mathbf{k}_4),k=0,1,2,\ldots,M-1 \\ (4) \quad k \end{array}$$

$$\mathbf{k}_1=G(t_k,\mathbf{y})\mathbf{k}_2=G\left(t_k+\frac{h}{2},\mathbf{y}_k+\frac{h}{2}\mathbf{k}_1\right)\mathbf{k}_3=G\left(t_k+\frac{h}{2},\mathbf{y}_k+\frac{h}{2}\mathbf{k}_2\right)\mathbf{k}_4=G(t_k+h,\mathbf{y}+h\mathbf{k}_3)$$

$$\begin{array}{l} N= \\ 3,\overline{M}= \\ 11,h= \\ 0.01 \\ change equations A = \\ -34 \\ \frac{1}{1} \\ \frac{101}{1} \\ \frac{43}{1} \\ tx_i \\ x_1 \quad 0 \\ x_2 2.0752 \times 10^{-8} \\ x_3 8.3007 \times 10^{-8} \\ x_1 \quad 0 \\ x_2 2.0752 \times 10^{-8} \\ x_3 8.3007 \times 10^{-8} \\ tx_i \\ x_1 1.8168 \times 10^{-8} \\ x_2 6.0004 \times 10^{-8} \\ x_3 1.0184 \times 10^{-7} \\ x_1 1.8168 \times 10^{-8} \\ x_2 6.0004 \times 10^{-8} \\ x_3 1.0184 \times 10^{-7} \\ tx_i \\ x_1 \, 1.8168 \times 10^{-8} \, \, 1.8168 \times 10^{-8} \\ x_2 \, 3.9086 \times 10^{-8} \, \, 3.0422 \times 10^{-8} \\ x_3 \, 6.0004 \times 10^{-8} \, \, 6.0004 \times 10^{-8} \\ x_4 \, 8.0922 \times 10^{-8} \, \, 8.9587 \times 10^{-8} \\ x_5 \, 1.0184 \times 10^{-7} \, \, 1.0184 \times 10^{-7} \\ x_1 \, 1.7986 \times 10^{-14} \, \, 1.8208 \times 10^{-14} \\ x_2 \, 2.2604 \times 10^{-13} \, \, 1.4033 \times 10^{-13} \\ x_4 \, 3.476 \times 10^{-13} \, \, 3.476 \times 10^{-13} \end{array}$$