

CN #53 / 24 maggio 2013 / A11

Oss: • Per $T > 0.3$ la procedura che usa il metodo IMPLICITO mantiene $h = h_{MAX} = \frac{t_f - t_0}{10} = 0.2$;

- dal grafico di \log_{10} (Stima EL) si deduce che 0.2 è un passo "troppo piccolo" per ottenere $EL_k \cong EL_{MAX}$ (che è l'intento del meccanismo di controllo del passo...)

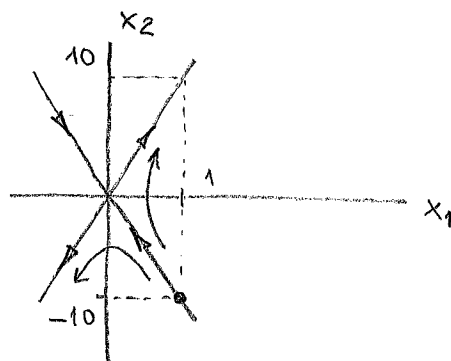
Es: Pb. di Cauchy:
$$\begin{cases} \dot{x}(t) = \begin{bmatrix} 0 & 1 \\ 100 & 0 \end{bmatrix} x(t) \\ x(0) = \begin{pmatrix} 1 \\ -10 \end{pmatrix} \end{cases} \quad t \in [0, t_f]$$

• soluzioni: $x(t) = e^{-10t} \begin{bmatrix} 1 \\ -10 \end{bmatrix}$

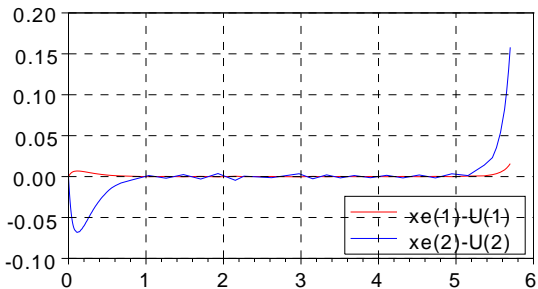
• se $x(0) = \alpha \begin{bmatrix} 1 \\ -10 \end{bmatrix} + \beta \begin{bmatrix} 1 \\ 10 \end{bmatrix}$ allora:

$$x(t) = \alpha e^{-10t} \begin{bmatrix} 1 \\ -10 \end{bmatrix} + \beta e^{10t} \begin{bmatrix} 1 \\ 10 \end{bmatrix}$$

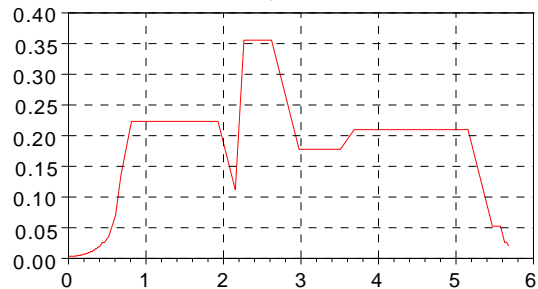
• piano delle fasi:



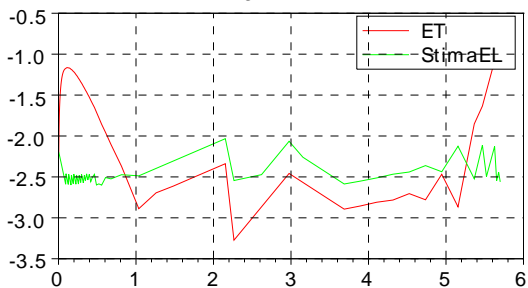
soluzione



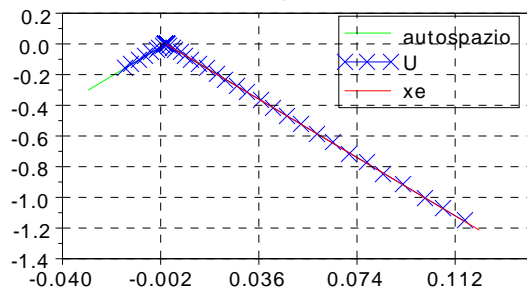
passo



log10 errore



traiettoria nel piano delle fasi



Errore totale massimo = 1.587D-01

Numero passi = 103

Passo:

minimo = 3.563D-03

medio = 5.568D-02

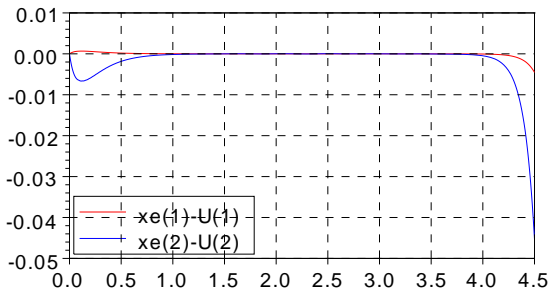
massimo = 3.566D-01

Problema: $dx/dt = A x$, $x(0) = x_0$

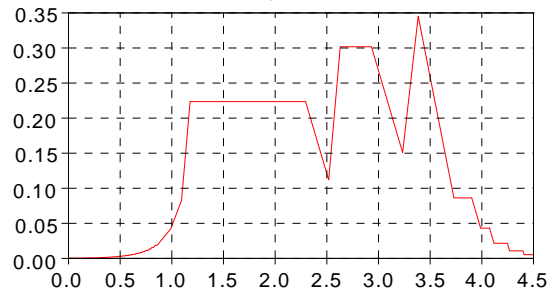
Procedura: LMV_eulero_pv

EL_MAX = 1.000D-02

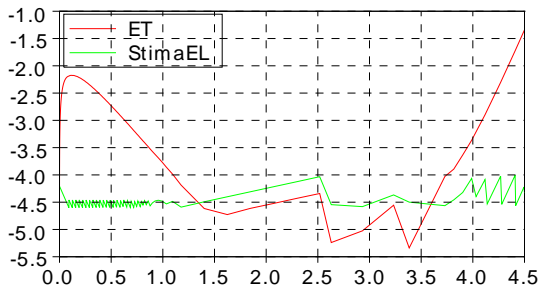
soluzione



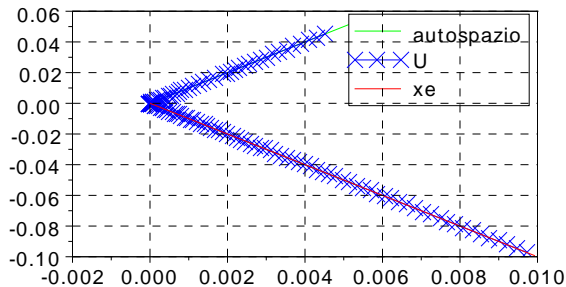
passo



log10 errore



traiettoria nel piano delle fasi



Errore totale massimo = 4.556D-02

Numero passi = 831

Passo:

minimo = 3.516D-04

medio = 5.416D-03

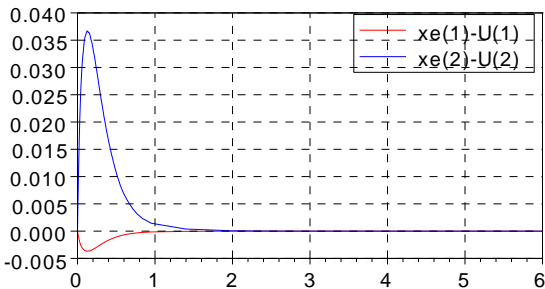
massimo = 3.452D-01

Problema: $dx/dt = A x$, $x(0) = x_0$

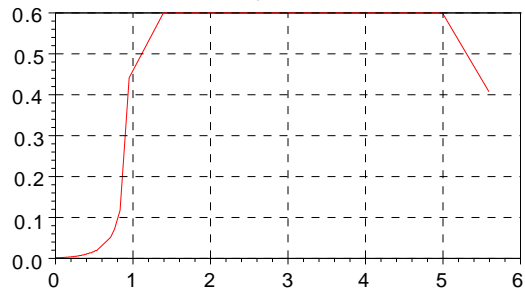
Procedura: LMV_eulero_pv

EL_MAX = 1.000D-04

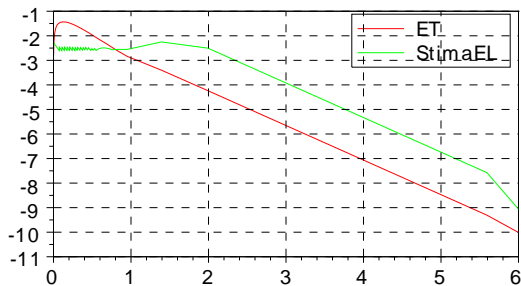
soluzione



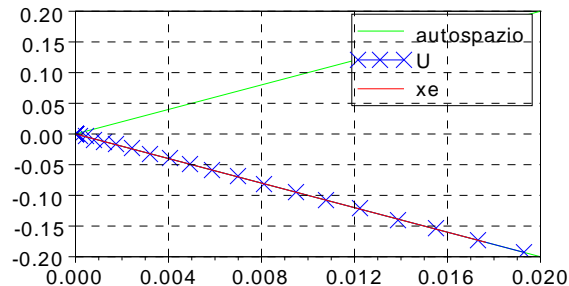
passo



log10 errore



traiettoria nel piano delle fasi



Errore totale massimo = 3.686D-02

Numero passi = 146

Passo:

minimo = 1.875D-03

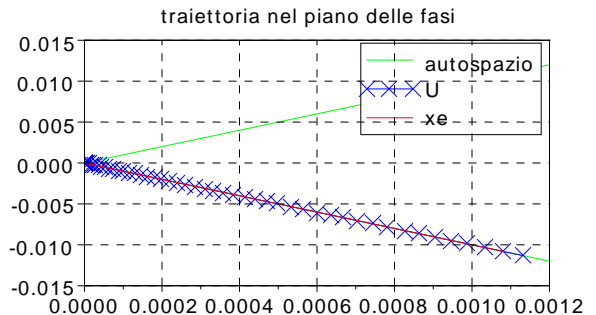
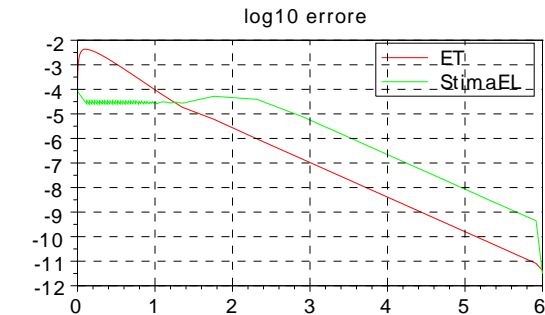
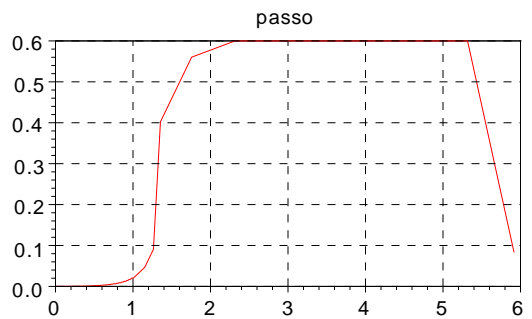
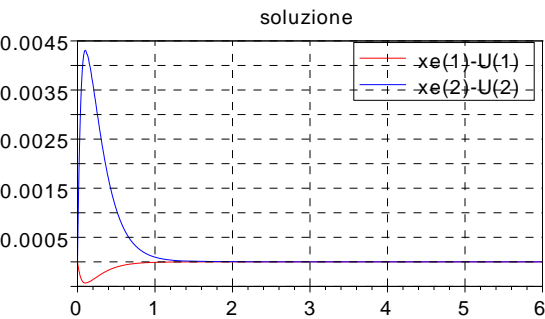
medio = 3.857D-02

massimo = 6.000D-01

Problema: $dx/dt = A x$, $x(0) = x_0$

Procedura: LMV_eulero_imp_pv

EL_MAX = 1.000D-02



Errore totale massimo = 4.328D-03

Numero passi = 1304

Passo:

minimo = 2.344D-04

medio = 4.541D-03

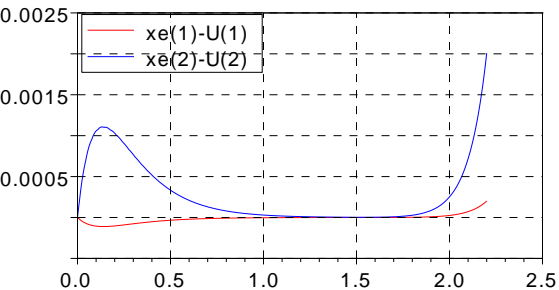
massimo = 6.000D-01

Problema: $dx/dt = A x$, $x(0) = x_0$

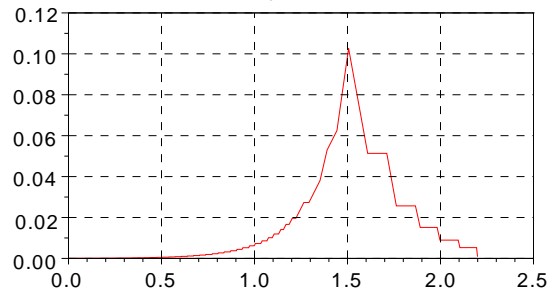
Procedura: LMV_eulero_imp_pv

EL_MAX = 1.000D-04

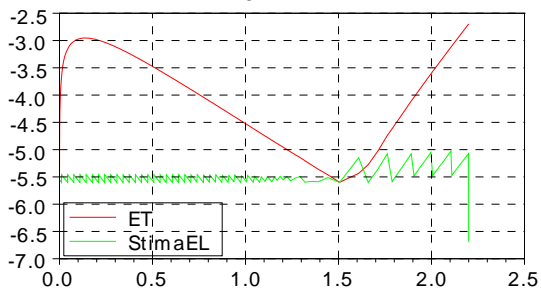
soluzione



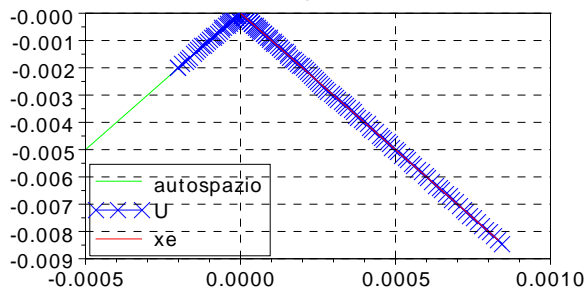
passo



log10 errore



traiettoria nel piano delle fasi



Errore totale massimo = 2.018D-03

Numero passi = 4575

Passo:

minimo = 4.297D-05

medio = 4.808D-04

massimo = 1.027D-01

Problema: $dx/dt = A x$, $x(0) = x_0$

Procedura: LMV_eulero_imp_pv

EL_MAX = 1.000D-05