**main.f90**

! program rungekinc

external fcn

open(1,file='inpaula.txt')

open(2,file='outnum.txt')

open(3,file='outteo.txt')

open(4,file='outexemplo.txt')

!

! integrador de EDO's com passo fixo - RK 4a ordem

!

read(1,\*)n,tau0

write(\*,\*)'n=',n,'tau0=',tau0

read(1,\*) tend,dtau,teta0

write(\*,\*)'tend=',tend,'dtau=',dtau,'teta0=',teta0

!

! initial values

!

erro=0.

teta=teta0

tetateo=teta0

time=tau0

k=0

write(\*,\*) ' Tabela de resultados'

write(\*,\*)'---------------------------------------------------------------------'

write(\*,\*)' Passo Nr t x(t) xteo(t) Erro (ETL)'

write(\*,\*)'---------------------------------------------------------------------'

write(\*,\*)k,time,teta,tetateo,erro

write(4,\*) ' Tabela de resultados'

write(4,\*)'---------------------------------------------------------------------'

write(4,\*)' Passo Nr t x(t) xteo(t) Erro (ETL)'

write(4,\*)'---------------------------------------------------------------------'

write(4,\*)k,time,teta,tetateo,erro

write(2,\*)time,teta

write(3,\*)time,teta

50 k=k+1

th=time+0.5\*dtau

f1=dtau\*fcn(time,teta)

f2=dtau\*fcn(th,teta+0.5\*f1)

f3=dtau\*fcn(th,teta+0.5\*f2)

f4=dtau\*fcn(time+dtau,teta+f3)

teta=teta+(f1+2.\*f2+2.\*f3+f4)/6.

time=time+dtau

if (time.le.tend) then

write(\*,\*)k,time,teta

write(2,\*)time,teta

! tetateo=exp(-time\*\*2/2)

tetateo=time/(0.5+log(time))

erro=abs(teta-tetateo)

write(3,\*)time,tetateo

write(4,\*)k,time,teta,tetateo,erro

goto 50

else

goto 300

endif

300 continue

close(2)

close(3)

close(4)

call system('notepad outnum.txt')

call system('notepad outteo.txt')

call system('notepad outexemplo.txt')

call system('wgnuplot dados.gnu') ! gráfico

stop

end

!\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

function fcn(t,f)

! aux=-t\*f

aux=(t\*f-f\*\*2)/t/t

fcn=aux

return

end

!\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**dados.gnu**

set data style linespoints

set grid

set xlabel 'Tempo t'

set ylabel 'Solução teórica e numérica x(t)'

set title 'Comparação numérico x teórico'

plot 'outnum.txt','outteo.txt'

pause -1

**inpaula.txt**

1 1.d0

3.d0 0.0078125d0 2.d0