In[63]:=
```
ClearAll["Global`*"];
(* 3. Set the current working directory to "the current directory" *)
SetDirectory[
  ToFileName[Extract["FileName" /. NotebookInformation[EvaluationNotebook[]],
    {1}, FrontEnd`FileName]]];
(* 4. Read in your input data in current directory and compute *)
<< BVPh2_0.m;
<< Algorithm.m
```

Package BVPh.m was successfully loaded from C:\Users\Shiteq\Desktop\Fatunbi HAM\BVPh2_0.m !

Last updated by Yin-long Zhao, 00:22, Apr. 26, 2013.

The input file C:\Users\Shiteq\Desktop\Fatunbi HAM\Algorithm.m is loaded !

The values of control parameters in BVPh:

Ntruncated	=	10
NtermMax	=	100
Nintegral	=	200
ErrReq	=	$1.\times 10^{-28}$
NgetErr	=	2
ComplexQ	=	0
PRN	=	1
ApproxQ	=	0
TypeL	=	TypeL
TypeBase	=	TypeBase
HYBRID	=	HYBRID
FLOAT	=	1
Naccu	=	100

About the system of ODEs:

It has 3 differential equation(s) subject to 7 boundary conditions.

(1) Governing equation(s):

1th ODE: $0.181818\, e^{-2z} + 0.181818\,(\theta[z] - 0.1\,\phi[z]) - 0.181818\, f'[z]^2 - 1.81818\left(0.1\, f'[z] + 0.1\, f'[z]^2\right) + f[z]\, f''[z] + 1.1\, f^{(3)}[z] - 0.0055\, f''[z]^2\, f^{(3)}[z] = 0,$

2th ODE: $f[z]\,\theta'[z] + 0.2\,\theta'[z]^2 + 0.45\,(1 + 0.5\,\theta[z])^2\,\theta'[z]^2 + 0.5\,\theta'[z]\,\phi'[z] + \left(1 + 0.3\,(1 + 0.5\,\theta[z])^3 + 0.1\,\theta[z]\right)\theta''[z] = 0,$

3th ODE: $-0.181818\,\phi[z] + f[z]\,\phi'[z] + 0.2\,\theta''[z] + \phi''[z] = 0,$

(2) Boundary conditions:

1th BC: $-0.1 + f[0] = 0,$

2th BC: $-1 + f'[0] = 0,$

3th BC: $0.2\,(1 - \theta[0]) + \theta'[0] = 0,$

4th BC: $0.2\,(1 - \phi[0]) + \phi'[0] = 0,$

5th BC: $f'[\text{infinity}] = 0,$

6th BC: $\theta[\text{infinity}] = 0,$

7th BC: $\phi[\text{infinity}] = 0,$

(3) Domain of the ODE:

1th ODE: 0 <= z <= infinity

2th ODE: 0 <= z <= infinity

3th ODE: 0 <= z <= infinity

(4) Integral interval of the error:

1th ODE: 0 <= z <= 20

2th ODE: 0 <= z <= 20

3th ODE: 0 <= z <= 20

Convergence-control parameters in HAM:

(1) Initial guess(es):

$u[1, 0] = 1.1 - e^{-z}$

$u[2, 0] = 0.166667\, e^{-z}$

$u[3, 0] = 0.166667\, e^{-z}$

(2) Auxiliary linear operator(s):

$L[1, u] = u''[z] + u^{(3)}[z]$

$L[2, u] = u'[z] + u''[z]$

$L[3, u] = u'[z] + u''[z]$

(3) Auxiliary function(s):

H[1, z] = 1

H[2, z] = 1

H[3, z] = 1

(4) Convergence-control parameter(s):

c0[1] = c0[1]

c0[2] = c0[2]

c0[3] = c0[3]

Computing optimal values...

ApproxQ = 0

TypeL = TypeL

k = 1

k = 2

k = 3

The minimum error at 3th order:

$\{2.28882 \times 10^{-6}, \{c0[1.] \to -0.734404, c0[2.] \to -0.811981, c0[3.] \to -0.597605\}\}$

Used CPU time = 45.8736 (seconds)

Computing higher order approximations...

ApproxQ = 0

TypeL = TypeL

k = 1

Used CPU time = 0.374986 (seconds)

```
k = 2
Err[2] = {1.693×10^-6, 9.40822×10^-6, 1.7621×10^-7}
Used CPU time = 1.49995 (seconds)
k = 3
Used CPU time = 2.64054 (seconds)
k = 4
Err[4] = {2.01627×10^-9, 2.46976×10^-7, 1.2174×10^-7}
Used CPU time = 5.84357 (seconds)
k = 5
Used CPU time = 9.17159 (seconds)
k = 6
Err[6] = {2.67526×10^-9, 1.01354×10^-8, 6.86611×10^-9}
Used CPU time = 17.2182 (seconds)
k = 7
Used CPU time = 24.7492 (seconds)
k = 8
Err[8] = {1.23103×10^-10, 5.00472×10^-10, 4.28312×10^-11}
Used CPU time = 39.7644 (seconds)
k = 9
Used CPU time = 55.3733 (seconds)
k = 10
Err[10] = {1.66129×10^-13, 2.50935×10^-11, 2.50939×10^-12}
Used CPU time = 84.61 (seconds)
Successful !
```

In[67]:=

In[68]:=