Analysing Rkadapt

In this example, we give ourself a target value from other source for comparative purpose wrt Rkadapt stability. An adopted step size is generally taken not to exceed 0.001 the range of the solution. This demo reveals that much smaller step size will be as good. Maybe not a good rule, unless not exigent about accuracy and if the computation time is of concern. We could use the target value to discriminate the Δ's at once [just not done so !]

$f(x) := \frac{\exp(-x)}{\sqrt{x}}$ $\varepsilon := 10^{-7}$ $target := 1.493648$

$N := 125$

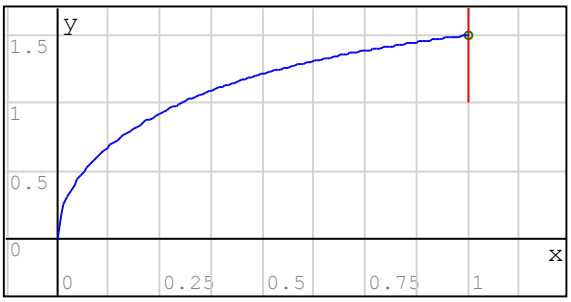
max 'N' ... < 10000 ... unknown

$sol := \text{Rkadapt}(0 ; \varepsilon ; 1 ; N ; f(x))$ $\text{row}(sol ; N+1) = [1.000000\ 1.493402]$

$Rkadapt :=$

50	1.494287
75	1.493620
100	1.493438
125	1.493402
150	1.496460
175	1.495543
200	1.495040
225	1.494573
250	1.494318
275	1.494047
300	1.493899
325	1.493733
350	1.493641
375	1.493533
400	1.493470
425	1.493421
450	1.493357
475	1.493323
500	1.493287
525	1.493246

Follow Rkadapt cumulative solving steps

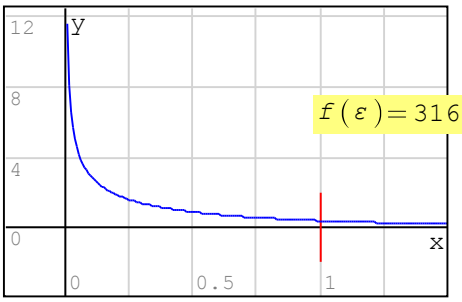


sol

1	2
1	1

[1 target "o" 7 "green"]

Function to be integrated



f(x)

1	2
1	−2

The puzzling dn_GearsBDF wrt last solution

$n := 1000$

$SOL := \text{dn\_GearsBDF}(0 ; \varepsilon ; 1 ; n ; f(x))$ $\text{rows}(SOL) = 1001$

$\text{row}(SOL ; n-0) = [0.999000\ 1.493088]$ apparent cycling solutions

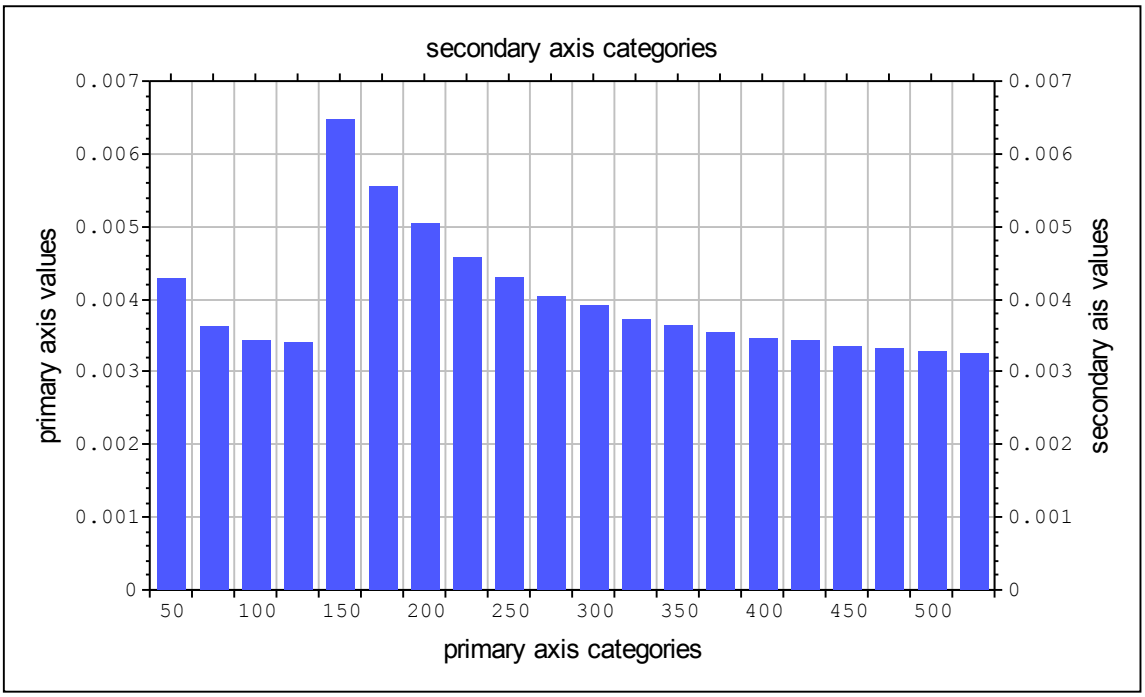
$\text{row}(SOL ; n+1) = [1.000000\ 1.493457]$ fixed value, no matter 'n'

Expose Rkadapt step size 'n'

$Rkadapt := Rkadapt_{1..20\,1..2}$

$stability := \text{augment}(\text{col}(Rkadapt ; 2) - 1.49 ; \text{col}(Rkadapt ; 1))$

secondary axis categories


secondary axis categories
primary axis values
secondary ais values
primary axis categories
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
50
100
150
200
250
300
350
400
450
500

stability