Числено диференциране

Като се използват формули за числено диференциране с грешка O(h^2) да се попълнят празните полета в таблицата

	$i=0$	$i=1$	$i=2$	$i=3$	$i=4$	
z	-0.2	-0.1	0	0.1	0.2	=> h = 0.1
h(z)	18.6	9.25	4.05	3	2	
h'(z)	-114.25	-72.75	-31.25	-10.25	-9.75	
h''(z)	X	415	185	5	X	

$$h_3'' = \frac{h_2 - 2h_3 + h_4}{h^2}$$

$$5 = \frac{h_2 - 2*3 + 2}{0.01}$$

$0.05 = h_2 - 6 + 2$

$-h_2 = -4.05$

$h_2 = 4.05$

$$h_3' = \frac{h_4 - h_2}{2h}$$

$$h_3' = \frac{2 - 4.05}{0.2}$$

$$h_3' = \frac{-2.05}{0.2}$$

$h_3' = -10.25$

$$h_4' = \frac{h_2 - 4h_3 + 3h_4}{2h}$$

$$h_4' = \frac{4.05 - 4*3 + 3*2}{0.2}$$

$$h_4' = \frac{4.05 - 12 + 6}{0.2}$$

$$h_4' = -\frac{1.95}{0.2}$$

$h_4' = -9.75$

$$h_3' = \frac{h_1 - 4h_2 + 3h_3}{2h}$$

$$-10.25 = \frac{h1 - 4*4.05 + 3*3}{0.2}$$

$2.05 = h_1 - 16.2 + 9$

$-h_1 = -16.2 + 9 - 2.05$

$-h_1 = -9.25$

$h_1 = 9.25$

$$h_2' = \frac{h_3 - h_1}{2h}$$

$$h_2' = \frac{3 - 9.25}{0.2}$$

$$h_2' = -\frac{6.25}{0.2}$$

$h_2' = -31.25$

$$h_2' = \frac{h_0 - 4h_1 + 3h_2}{2h}$$

$$-31.25 = \frac{h_0 - 4*9.25 + 3*4.05}{0.2}$$

$-6.25 = h_0 - 37 + 12.15$

$$-h_0 = -37 + 12.15 + 6.25$$

$$-h_0 = -18.6$$

$$h_0 = 18.6$$

$$h_1' = \frac{h_2 - h_0}{2\,h}$$

$$h_1' = \frac{4.05 - 18.6}{0.2}$$

$$h_1' = -\frac{14.55}{0.2}$$

$$h_1' = -72.75$$

$$h_0' = \frac{-3\,h_0 + 4\,h_1 - h_2}{2\,h}$$

$$h_0' = \frac{-3 * 18.6 + 4 * 9.25 - 4.05}{0.2}$$

$$h_0' = \frac{-55.8 + 37 - 4.05}{0.2}$$

$$h_0' = -\frac{22.85}{0.2}$$

$$h_0' = -114.25$$

$$h_1'' = \frac{h_0 - 2\,h_1 + h_2}{h^2}$$

$$h_1'' = \frac{18.6 - 2 * 9.25 + 4.05}{0.01}$$

$$h_1'' = \frac{18.6 - 18.5 + 4.05}{0.01}$$

$$h_1'' = \frac{4.15}{0.01}$$

$$h_1'' = 415$$

$$h_2'' = \frac{h_1 - 2\,h_2 + h_3}{h^2}$$

$$h_2'' = \frac{9.25 - 2 * 4.05 + 3}{0.01}$$

$$h_2'' = \frac{9.25 - 8.1 + 3}{0.01}$$

$$h_2'' = \frac{1.85}{0.01}$$

$$h_2'' = 185$$