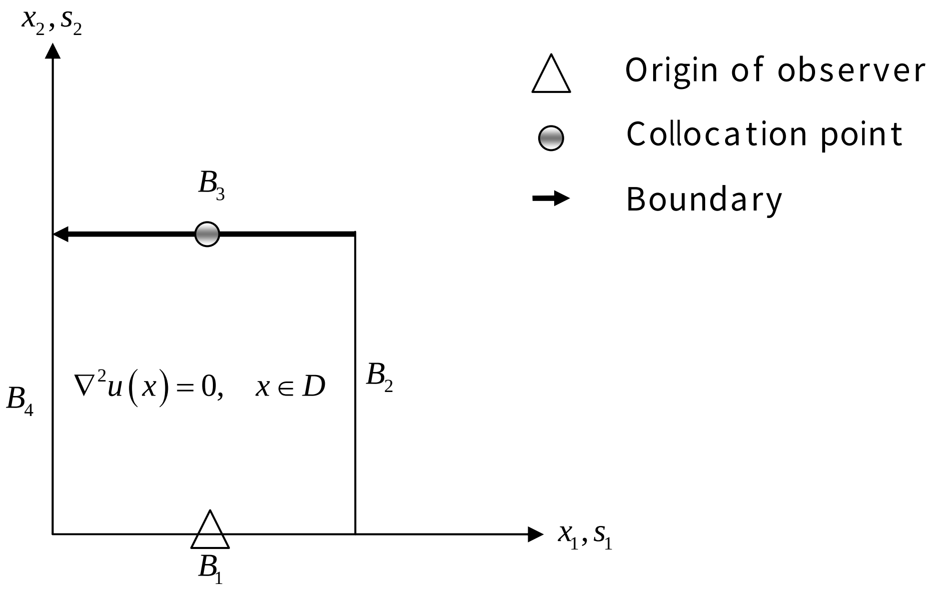


$$\rho = 1, \ \phi = \frac{\pi}{2}, \ \theta = 0$$

$$U_{31}(s,x) = \ln \rho - \sum_{m=1}^{\infty} \frac{1}{m}\left(\frac{R}{\rho}\right)^m \cos m(\theta - \phi) = -\sum_{m=1}^{\infty} \frac{1}{m}(R)^m \cos\frac{m\pi}{2}$$

$$T_{31}(s,x) = -\sin\theta \frac{\partial U(s,x)}{\partial R} - \frac{\cos\theta}{R}\frac{\partial U(s,x)}{\partial \theta} = \sum_{m=1}^{\infty} (R)^{m-1} \sin\frac{m\pi}{2}$$

$$L_{31}(s,x) = \sin\phi \frac{\partial U(s,x)}{\partial \rho} + \frac{\cos\phi}{\rho}\frac{\partial U(s,x)}{\partial \phi} = 1 + \sum_{m=1}^{\infty} (R)^m \cos\frac{m\pi}{2}$$

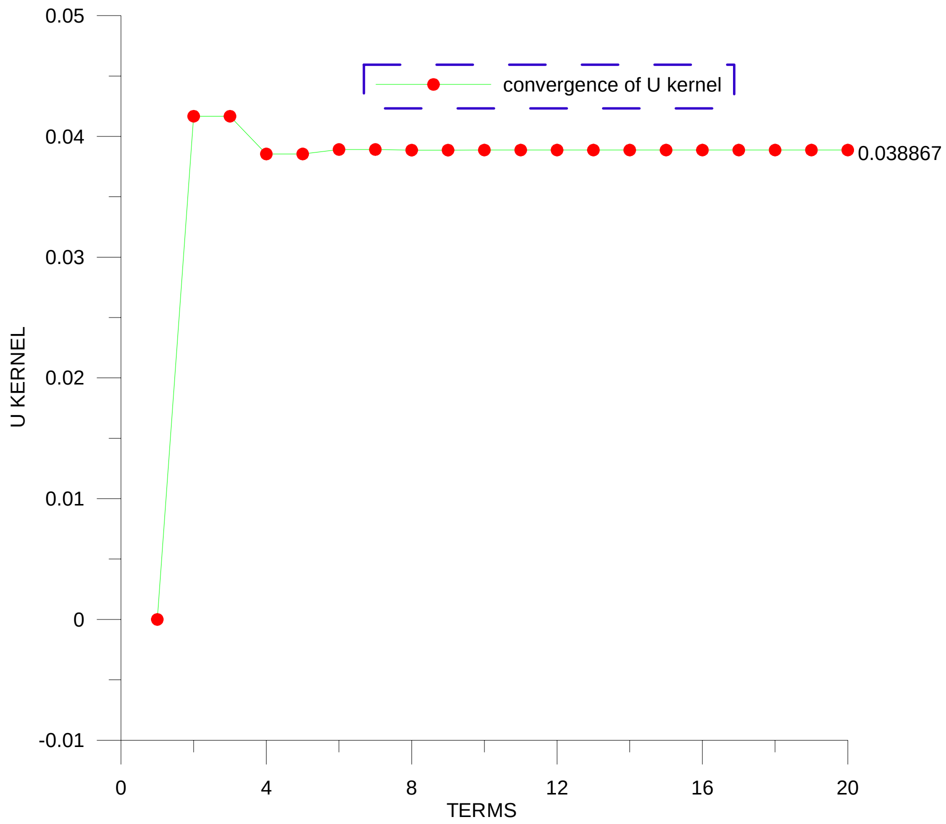
$$M_{31}(s,x) = \sin\phi \frac{\partial T(s,x)}{\partial \rho} + \frac{\cos\phi}{\rho}\frac{\partial T(s,x)}{\partial \phi} = -\sum_{m=1}^{\infty} m(R)^{m-1} \sin\frac{m\pi}{2}$$

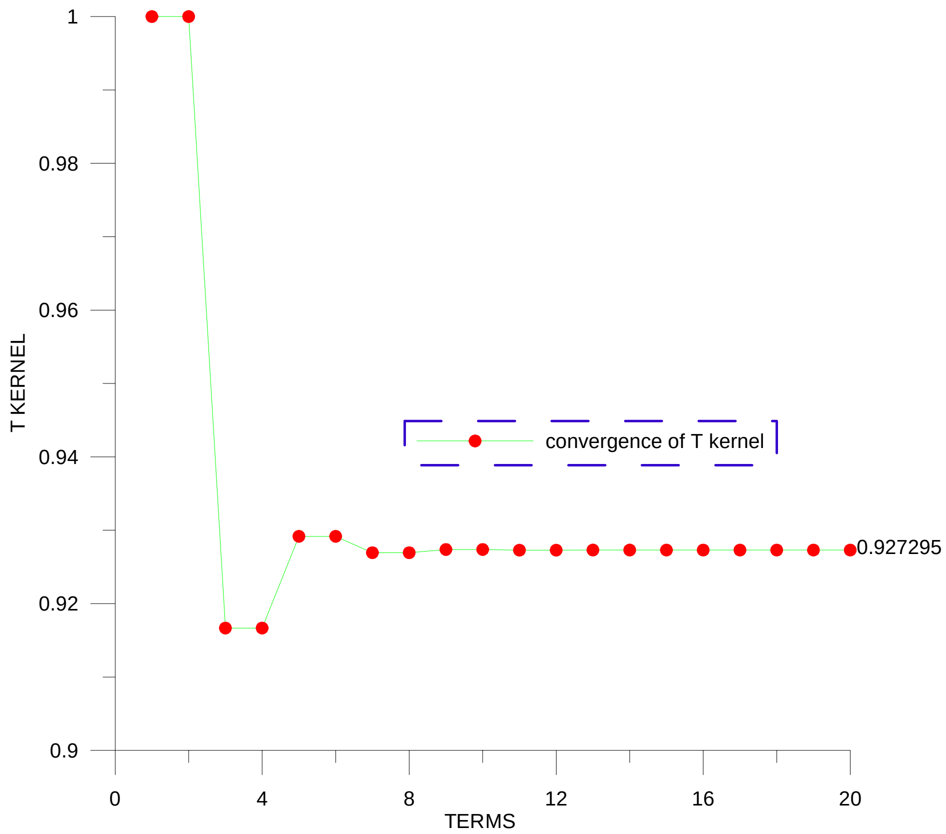
$$2\int_0^{\frac{1}{2}} U_{31}(s,x)\,dR = -2\sum_{m=1}^{\infty} \frac{1}{m(m+1)}\left(\frac{1}{2}\right)^{m+1} \cos\frac{m\pi}{2} = 0.038867$$

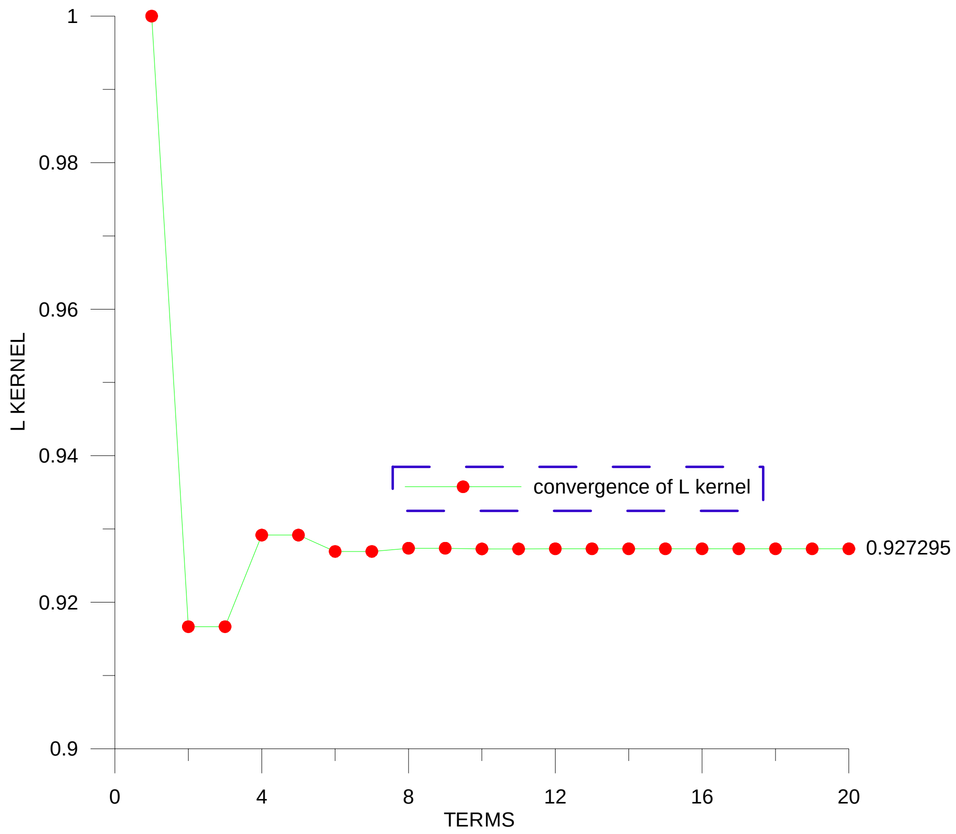
$$2\int_0^{\frac{1}{2}} T_{31}(s,x)\,dR = 2\sum_{m=1}^{\infty} \frac{1}{m}\left(\frac{1}{2}\right)^{m} \sin\frac{m\pi}{2} = 0.927295$$

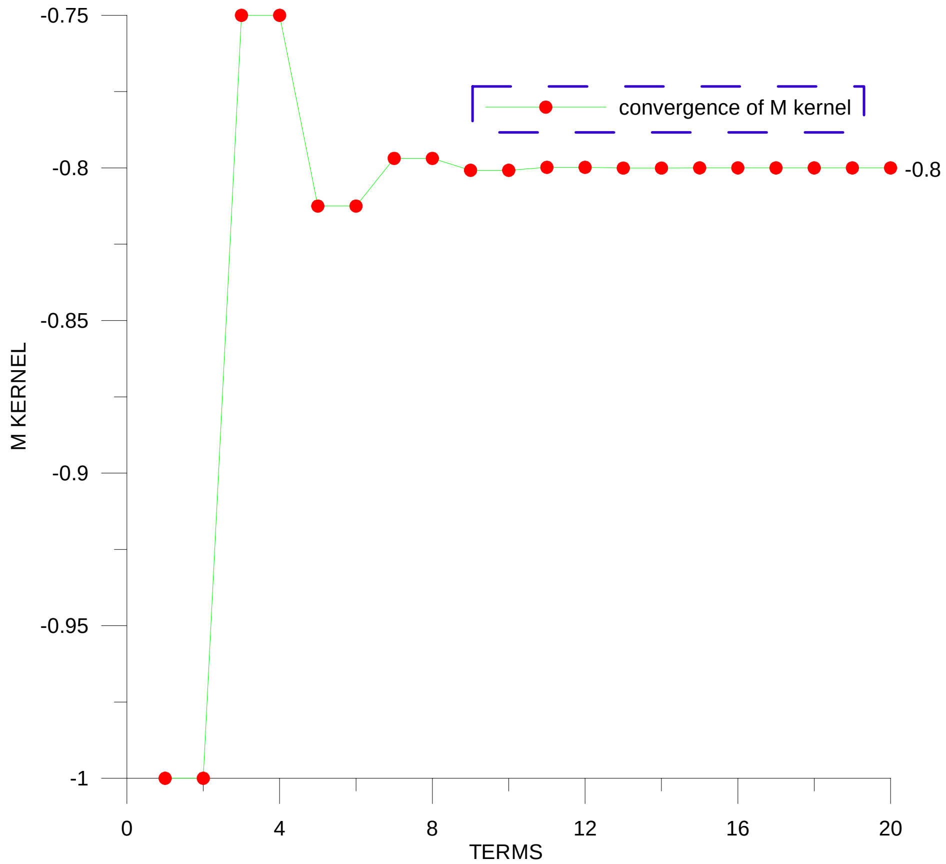
$$2\int_0^{\frac{1}{2}} L_{31}(s,x)\,dR = 1 + 2\sum_{m=1}^{\infty} \frac{1}{(m+1)}\left(\frac{1}{2}\right)^{m+1} \cos\frac{m\pi}{2} = 0.927295$$

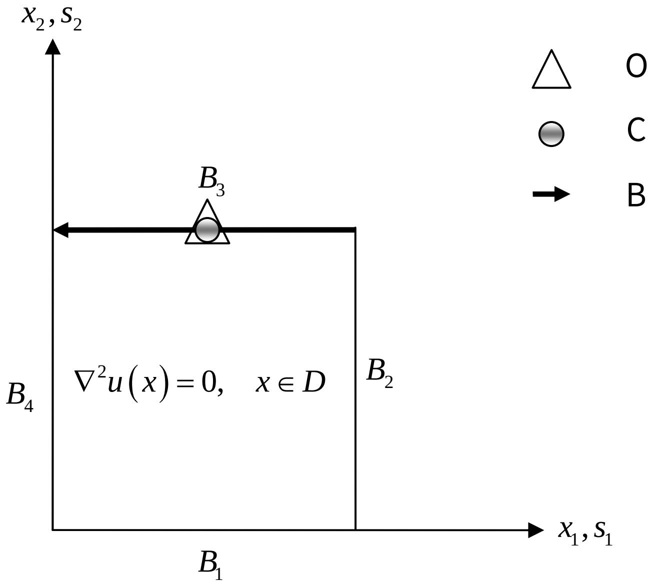
$$2\int_0^{\frac{1}{2}} M_{31}(s,x)\,dR = -2\sum_{m=1}^{\infty} \left(\frac{1}{2}\right)^{m} \sin\frac{m\pi}{2} = -0.8$$


0.05
0.04
0.03
0.02
0.01
0
-0.01
U KERNEL
0
4
8
12
16
20
TERMS
convergence of U kernel
0.038867


1
0.98
0.96
0.94
0.92
0.9
T KERNEL
0
4
8
12
16
20
TERMS
convergence of T kernel
0.927295


L KERNEL
1
0.98
0.96
0.94
0.92
0.9
convergence of L kernel
0.927295
0
4
8
12
16
20
TERMS


M KERNEL
-0.75
-0.8
-0.85
-0.9
-0.95
-1
convergence of M kernel
-0.8
0
4
8
12
16
20
TERMS



$$x\left(\frac{1}{2},\varepsilon\right),\ \ s(s,1),\ \ y_1=\frac{1}{2}-s,\ \ y_2=\varepsilon-1,\ \ n_1=0,\ \ n_2=1,\ \ \overline{n_1}=0,\ \ \overline{n_2}=1$$

$$\int_0^1 U_{33}(s,x)\,ds=\int_0^1 \ln\sqrt{\left(\left(\frac{1}{2}-s\right)^2+(\varepsilon-1)^2\right)}ds=-1.69315$$

$$\int_0^1 T_{33}(s,x)\,ds=\int_0^1 -\left(\frac{\varepsilon-1}{\left(\frac{1}{2}-s\right)^2+(\varepsilon-1)^2}\right)ds=-3.14159$$

$$\int_0^1 L_{33}(s,x)\,ds=\int_0^1 \left(\frac{\varepsilon-1}{\left(\frac{1}{2}-s\right)^2+(\varepsilon-1)^2}\right)ds=3.14159$$

$$\int_0^1 M_{33}(s,x)\,ds=\int_0^1 \left(2\frac{(\varepsilon-1)^2}{\left[\left(\frac{1}{2}-s\right)^2+(\varepsilon-1)^2\right]^2}-\frac{1}{\left(\frac{1}{2}-s\right)^2+(\varepsilon-1)^2}\right)ds=4$$