What this code is about

The `c++` code `fourth.cpp` computes the highlighted term below in the first term of the right-hand side of equation (4.39)

$$-\sum_{k=0}^{\infty}\frac{\mu_{-(2k+2)}}{\kappa^{k-1}} = -\sum_{k=0}^{\lfloor\frac{d-1}{2}\rfloor}\frac{1}{\kappa^{k-1}}\left(I_k+J_k+L_k\right) - \sum_{k=\lfloor\frac{d-1}{2}\rfloor+1}^{\infty}\frac{M_k}{\kappa^{k-1}}, \tag{1}$$

where

$$M_k = \sum_{m=0}^{d} c_m m! \sum_{l=0}^{m}\frac{(-1)^l}{(l!)^2(m-l)!}\int_0^{\infty}\frac{e^{-x/2}}{x^{2k+1-l}}\mathrm{d}x. \tag{2}$$

and

$$\int_0^{\infty}\frac{e^{-x/2}}{x^{2k+1-l}}\mathrm{d}x = \frac{(-1)^{1-l}\left(\frac{1}{2}\right)^{2k-l}}{(2k-l)!}\left(\ln\left(\frac{1}{2}\right)-\psi(2k+1-l)\right). \tag{3}$$

The code requires the $d+1$ numbers c_m's as inputs. These are read-in from the file `../Constants/Constant.txt`. The code outputs values for $\kappa = 10^{-5} - 10^{23}, 0.2$ and $\kappa = 4$ to the file `..results/FOURTH.txt`.

The file `run.sh` encapsulates commands to build and run the application using the `CMakeLists.txt` on local machine running on Ubuntu 24.04.