For Step 1), many schemes exist to assign charges to the mesh. The best ones are those that reduce the fluctuations of the force when the particles are near each other. This reduction in force fluctuation can be quantified with a constraint called: "smoothness." Smoothness is the continuity of the derivatives of the approximated function used in assigning charges to the mesh.

For Step 2), the PM method solves the Poisson equation:

*del^2(phi) = 4 \* pi \* G \** *rho*

for the gravitational potential *phi,* (usually) using an FFT technique. The transform is is computed by multiplication with a suitable Green's function for the Poisson equation (which contains a spatially-varying part of the mass density field). Periodic boundary conditions are usually used to simulate an "infinite universe."

<http://www.cs.cmu.edu/afs/cs/academic/class/15850c-s96/www/nbody.html#symp>

csl condition:

<https://www.simscale.com/blog/2017/08/cfl-condition/>