

# Fast evaluation of Newton potentials in BEM

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## **Abstract**

This talk is concerned with the evaluation of Newton potentials in the case of the Poisson equation and the system of linear elastostatics. First, a direct evaluation of the Newton potentials is considered. This direct evaluation can be accelerated by the use of the Fast Multipole Method. As an alternative to the direct computation, the conormale derivative of the Newton potential can be computed indirectly by solving a boundary integral equation applied to the standard Newton potential. The efficiency of direct and indirect computations is compared in numerical examples.

If the volume function satisfies a certain partial differential equation, the Newton potentials can be reduced to surface integrals by applying integration by parts. Then a meshing of the volume is not needed for the simulation at all. Such an approach is applied to an electromechanical coupling and tested in numerical examples.