

In this thesis we explore numerical methods that could be used to solve Laplace's equation. We compare the boundary element method (BEM), implemented in Bempp library, and the finite element method (FEM), implemented in FEniCS library, by using them to solve Laplace's equation in the cases of a multipole and a rf ion trap, which we create a model of through the use of Gmsh. In order to gauge effectiveness of a method, we measure the time of evaluation, memory usage and the squared deviation from theoretical values (if we know them) summed over the points of evaluation. In the end, we use the known values of electric field to simulate a charged particle moving within the trap, comparing evolution of its position and velocity for BEM and FEM.

