

C++ code 5.5.18: Incomplete listing of `newtonNextIt()`

```
1 void newtonNextIt(
2     std::shared_ptr<const If::uscalfe::FeSpaceLagrangeO1<double>> fes_p,
3     Eigen::VectorXd &mu_vec, Eigen::VectorXd &rhs_vec) {
4     If::mesh::utils::MeshFunctionConstant mf_one(1.);
5     If::mesh::utils::MeshFunctionConstant mf_zero(0.);
6     const If::fe::MeshFunctionFE mf_uh_prev(fes_p, mu_vec);
7
8     const FunctionMFWrapper mf_coeff1_uh_prev(
9         [fes_p, mu_vec](), [fes_p, mu_vec]());
10    const FunctionMFWrapper mf_coeff2_uh_prev(
11        [fes_p, mu_vec](), [fes_p, mu_vec]());
12    // We define some variables for easy access
13    const If::mesh::Mesh &mesh{*(fes_p->Mesh())};
14    const If::assemble::DofHandler &dofh{fes_p->LocGlobMap()};
15    const std::size_t N_dofs(dofh.NumDofs());
16    // Assemble matrix A
17    If::assemble::COOMatrix<double> A(N_dofs, N_dofs);
18    If::uscalfe::ReactionDiffusionElementMatrixProvider<double>
19        elmat_provider(fes_p, [fes_p, mu_vec](), [fes_p, mu_vec]());
20    If::assemble::AssembleMatrixLocally(0, dofh, dofh, elmat_provider, A);
21
22    // Assemble Galerkin in Eigen::SparseMatrix format
23    If::assemble::COOMatrix<double> M(N_dofs, N_dofs);
24    If::uscalfe::ReactionDiffusionElementMatrixProvider<double>
25        elmat_provider_M(fes_p, mf_one, mf_zero);
26    If::assemble::AssembleMatrixLocally(0, dofh, dofh, elmat_provider_M, M);
27    Eigen::SparseMatrix<double> M_crs = M.makeSparse();
28
29    // Construct the right-hand side of the system
30    Eigen::VectorXd phi(N_dofs); phi.setZero();
31    phi += [fes_p, mu_vec]();
32    phi -= [fes_p, mu_vec]();
33    If::uscalfe::ScalarLoadElementVectorProvider<double>
34        elvec_builder(fes_p, [fes_p, mu_vec]());
35    If::assemble::AssembleVectorLocally(0, dofh, elvec_builder, phi);
36
37    // Enforce homogeneous Dirichlet boundary conditions
38    auto bd_flags{If::mesh::utils::flagEntitiesOnBoundary(fes_p->Mesh(), 2)};
39    // Elimination of degrees of freedom on the boundary. Also sets the
40    // corresponding entries of rhs_vec to zero.
41    If::assemble::FixFlaggedSolutionComponents<double>(
42        [&bd_flags,
43         &dofh](If::assemble::glb_idx_t gdof_idx) -> std::pair<bool, double> {
44            const If::mesh::Entity &node{dofh.Entity(gdof_idx)};
45            return (bd_flags(node) ? std::make_pair(true, 0.0)
46                : std::make_pair(false, 0.0));
47        },
48        A, phi);
49    // Convert matrix A in COO format to A_crs in Eigen::SparseMatrix
    // format
```