

```

2 double integrateQuadraticFEFunction(const If::assemble::DofHandler &dofhandler,
3                                     const Eigen::VectorXd &mu) {
4     double l = 0;
5     std::shared_ptr<const If::mesh::Mesh> mesh = dofhandler.Mesh();
6     for (const auto *cell : mesh->Entities(0)) {
7         // check if we the FE space is really  $S_2^0$ 
8         if (dofhandler.NumLocalDofs(*cell) != 6) {
9             throw "Not a  $S_2^0$  FE space!";
10        }
11        const double weight = 1.0 / 3.0 * If::geometry::Volume(*(cell->Geometry()));
12        // iterate over dofs
13        auto int_dofs = dofhandler.GlobalDofIndices(*cell);
14        // The integrated basis functions associated with the nodes are 0:
15        //  $\int_K b_K^j dx = 0$  for  $j=1,2,3$ . Skip!
16        for (int l = 3; l < 6; ++l) {
17            // The integrated basis functions associated with the edges are:
18            //  $\int_K b_K^j dx = |K|/3$  for  $j=4,5,6$ 
19            // multiply by the value at the dof to get local contribution
20            l += (weight * mu(int_dofs[l]));
21        }
22    }
23    return l;
24 }

```