

This example solves the distributed minimization problem

$$\begin{aligned} \min J(q, u) &= \frac{1}{2} \|u - u^d\|^2 + \frac{\alpha}{2} \|q\|^2 \\ \text{s.t. } (\nabla u, \nabla \phi) &= (q + f, \phi) \quad \forall \phi \in H_0^1(\Omega) \\ \text{s.t. } -500 &\leq q \leq 500 \text{ a.e. in } \Omega \end{aligned}$$

on the domain $\Omega = [0, 1]^2$, and the data is chosen as follows:

$$\begin{aligned} f &= \left(20\pi^2 \sin(4\pi x) - \frac{1}{\alpha} \sin(\pi x) \right) \sin(2\pi y) \\ u^d &= (5\pi^2 \sin(\pi x) + \sin(4\pi x)) \sin(2\pi y) \end{aligned}$$

and $\alpha = 10^{-3}$.

In addition the following functionals are evaluated:

$$\text{MidPoint: } u(0.5; 0.5)$$

$$\text{MeanValue: } \int_{\Omega} u$$

The Problem is similar to that of `OPT/StatPDE/Example1` except for the box control constraints. Another new feature is the use of the commercial optimization library SNOPT. In order to use this library you need to install SNOPT on your computer and then generate a symlink to the snopt directory (where you have the libs and the header files) in the `D0pE/ThirdPartyLibs` directory named `snopt`, i.e., you should have the file `D0pE/ThirdPartyLibs/snopt` pointing to the snopt directory. If you have not done this you can compile the example but when running the example you will only get an error message like

```
Warning: During execution of 'Reduced_SnoptAlgorithm::Solve'
the following Problem occurred!
To use this algorithm you need to have SNOPT installed!
To use this set the WITH_SNOP CompilerFlag.
```