Numerical Simulation

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Prof. Dr. Carsten Burstedde
Philipp Morgenstern

universitätbonn

Exercise Sheet 7.

Due date: **Tuesday, 3 June**.

Exercise 10. Use the formal Lagrange technique to determine the necessary optimality conditions of the problem

$$\text{minimize} \quad J(y,u) := \tfrac{1}{2}\int_\Omega (y - y_\Omega)^2 \,\mathrm{d}x + \int_\Gamma e_\Gamma y \,\mathrm{d}s + \tfrac{1}{2}\int_\Omega u^2 \,\mathrm{d}x$$

under the volume condition $-\Delta y + y = u + e_\Omega$, boundary condition $\partial_\nu y = e_\Gamma$ and box condition $0 \le u(x) \le 1$.
Hint: Use two distinct multiplicators p_1 and p_2 for the volume condition and the boundary condition.

(6 points)

Exercise 11. Use the formal Lagrange technique to determine the necessary optimality conditions of the problem

$$\text{minimize} \quad J(y,u) := \int_\Omega (y - y_\Omega)^2 \,\mathrm{d}x + \lambda \int_\Gamma u^2 \,\mathrm{d}s$$

with conditions

$$-\Delta y = 0, \quad y|_\Gamma = u, \quad -1 \le u(x) \le 1.$$

(6 points)