Optimal control problems and algebraic flux correction schemes

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Solutions of convection-diffusion-reaction equations may possess layers, i.e., narrow regions where the solution has a large gradient (in particular for convection dominated equations). Standard finite element methods lead to discrete solutions which are polluted by spurious oscillations. The main motivation for the construction of the so-called algebraic flux correction (AFC) schemes is the satisfaction of the DMP to avoid spurious oscillations in the discrete solutions. We apply an AFC scheme to an optimal control problem governed by a convection-diffusion-reaction equation. Due to the fact that the AFC schemes are nonlinear and usually non-differentiable the approaches ”optimize-then-discretize” and ”discretize-then-optimize” do not commute. We use the ”optimize-then-discretize” approach, i.e., we discretize the state equation and besides the adjoint equation with the AFC method.

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