Discontinuous Galerkin finite element methods for convection-diffusion equations

B. Grieshaber
University of Cape Town
beverley.grieshaber@uct.ac.za

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While standard finite element methods are effective in solving certain boundary value problems, there are conditions in which they generate highly unsatisfactory results, such as in the convection-dominated case of the convection-diffusion equation. The use of a discontinuous Galerkin finite element method is one way to avoid some of the problems caused by these conditions.

I will discuss aspects of the analysis of these methods as well as their implementation, with particular reference to the diffusion and convection-diffusion equations.