Stability and convergence results for Algebraic Flux Correction schemes

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ABSTRACT

The numerical approximation of the convection–diffusion equation is known to be challenging, especially in the convection-dominated regime. A major drawback is the lack of positivity preserving schemes, i.e., schemes that satisfy the discrete maximum principle. Since linear schemes satisfying this property are known to lead to extremely diffusive results, an alternative approach has been to introduce nonlinear schemes, mostly inspired by the idea of shock capturing, to solve this equation.

One scheme that has received some attention over the last few years is the algebraic flux correction scheme. The origins of this method can be traced back to the late eighties, but they have been reframed recently in the works by D. Kuzmin. In this talk I will review some recent analytical results for this scheme, showing its advantages and limitations, and present a modification of it that makes it possible to prove that the discrete problem has a solution. I will also describe some general stability and convergence (in the pre-asymptotic regime) results for these schemes.