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Extensions of Active Flux to arbitrary order of accuracy

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Active Flux is a novel numerical method for hyperbolic conservation laws. In its classical formulation (third-order accurate), its degrees of freedom are cell averages and point values at cell interfaces, the latter shared between adjacent cells. Active Flux thus makes use of a globally continuous reconstruction, which is its distinctive feature. The update of the point values includes upwinding, but without solving a Riemann Problem, while the flux quadrature for the average update can be immediately performed using the point values at the cell interfaces. This approach, different from FV, DG and continuous finite element methods, is stable and has a number of further favorable properties, for example it can "marry" without parameters different formulations of the same conservative PDE. We explain why, in the limit of mesh refinement, the solution converges to a weak solution of the problem and propose for the first time extensions of Active Flux to arbitrary order of accuracy by either including more degrees of freedom, or enlarging the stencil. Stability of these extensions is studied, as well as their applicability to nonlinear systems of conservation laws.

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