Approximation of discontinuous solutions in high order discontinuous Galerkin schemes

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Abstract

The paper concerns high order discontinuous Galerkin schemes. The numerical solution of ordinary differential equations is considered for those problems where the approximation of a discontinuous solution is required. It will be shown that the high order discontinuous Galerkin approximation results in solution overshoots on a grid cell which contains a discontinuity. For a linear problem, analytical expressions are obtained to evaluate the amplitude of solution overshoots. Numerical examples confirming the theoretical results are given for both linear and nonlinear problems.