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Discontinuous Galerkin Method for Higher-Order Ordinary Differential Equations

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Abstract : In this paper, we study the super-convergence properties of the discontinuous Galerkin (DG) method applied to one-dimensional mth-order ordinary differential equations without introducing auxiliary variables. We found that nth−derivative of the DG solution exhibits an optimal O (hp+1−n) convergence rates in the L2-norm when p-degree piecewise polynomials with p≥1 are used. We further found that the odd-derivatives and the even derivatives are super convergent, respectively, at the upwind and downwind endpoints.

Keywords : discontinuous, galerkin, superconvergence, higherorder, error, estimates
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