1171-65-64 **Mahboub Baccouch*** (mbaccouch@unomaha.edu), DSC 233, 6001 Dodge st, Omaha, NE 68182.
Superconvergence and asymptotically exact a posteriori error estimator for the local discontinuous Galerkin method for elliptic problems on Cartesian grids. Preliminary report.

In this paper, we present a local discontinuous Galerkin (LDG) methods for two-dimensional second-order elliptic problems. Convergence properties for the solution and for the auxiliary variable that approximates its gradient are established. We prove that the LDG solution is superconvergent towards a particular projection of the exact solution. The order of convergence is proved to be p +2, when tensor product polynomials of degree at most pare used. Then, we show that the actual error can be split into two parts. The components of the significant part can be given in terms of (p +1)-degree Radau polynomials. We use these results to construct a reliable and efficient residual-type a posteriori error estimates. We prove that the proposed residual-type a posteriori error estimates converge to the true errors in the L2-norm under mesh refinement. Finally, we present a local AMR procedure that makes use of our local and global a posteriori error estimates. We provide several numerical examples illustrating the effectiveness of our procedures. (Received August 17, 2021)