1097-65-56 **Mahboub Baccouch*** (mbaccouch@unomaha.edu), DSC 233, Dept. of mathematics, 6001 dodge st., Omaha, NE 68182. *A superconvergent local discontinuous Galerkin method for the second-order wave equation on Cartesian grids.* Preliminary report.

We propose and analyze a new superconvergent local discontinuous Galerkin (LDG) method for the spatial discretization of the second-order wave equation on Cartesian grids. We prove the L^2 stability of the scheme and optimal L^2 error estimates for the semi-discrete formulation. In particular, we identify special numerical fluxes for which the L^2-norm of the solution and its gradient are of order $p+1$, when tensor product polynomials of degree at most p are used. We further show that the LDG solution is $O(h^{p+2})$ superconvergent at Radau points obtained as a tensor product of the roots of $(p+1)$-degree right Radau polynomial. Furthermore, numerical computations show that the first component of the solution's gradient is $O(h^{p+2})$ superconvergent at tensor product of the roots of left Radau polynomial in x and right Radau polynomial in y while the second component is $O(h^{p+2})$ superconvergent at the tensor product of the roots of the right Radau polynomial in x and left Radau polynomial in y. We use the superconvergence results to construct asymptotically correct a posteriori LDG error estimates. Finally, we present several numerical examples to validate the theoretical results. (Received January 06, 2014)