1038-65-337 **Alexander Alekseenko*** (alexander.alekseenko@csun.edu), Department of Mathematics, CSUN, 18111 Nordhoff St., Northridge, CA 91330-8313. *A Discontinuous Galerkin Method for Solving a Second Order Hyperbolic Equation with Differential Boundary Conditions.*

When solving initial-boundary value problems for evolution systems coupled to differential constraint equations, robustness of the numerical calculations depends, amidst other factors, on the choice of boundary conditions. The ideal boundary conditions must not perturb the constraint quantities, must result in a well-posed problem, and must minimize the spurious reflections of the radiation at the boundary. However, the boundary conditions that preserve the constraint equations, e.g., in numerical relativity, are often not in the maximally dissipative form. As the result, many approaches to the design of numerical schemes fail to guarantee algorithm's well-posedness. This motivated many authors to seek for alternative ways to constraint-preserving boundary conditions (CPBCs) and to discretizations of the constrained evolution problems.

A model constrained evolution problem is solved in the second oder form using Runge-Kutta discontinuous Galerkin methods. The boundary conditions are constructed using the standard theory of hyperbolic equations and the techniques for CPBCs. The constraints remain bounded when the CPBCs are used. A better control is achieved by introducing terms in the equations to damp the small constraint perturbations due to the discretization errors. (Received February 12, 2008)