1035-65-1798 **Alexander M. Alekseenko*** (alexander.alekseenko@csun.edu), Department of Mathematics, California State University, Northridge, 18111 Nordhoff St., Northridge, CA 91330-8313.
Numerical study of a set of differential boundary conditions for a problem of constrained evolution. Preliminary report.

When solving initial-boundary value problems for evolution systems coupled to differential constraints, the robustness of numerical calculations depends, amidst other factors, on the choice of constraint-compatible 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 are compatible with the constraint equations, in particular in numerical relativity, are often not in the maximally dissipative form. As the result, many approaches to design numerical schemes fail to guarantee algorithm's well-posedness. This motivated many authors to seek for alternative ways to constraint-compatible boundary conditions and to the discretizations of the constrained evolution problems.

In this work a model second order constrained evolution problem is solved using the Runge-Kutta discontinuous Galerkin method. We compare two discretizations of the second order equations: one suggested by the study of the evolution of the constraint quantities, and the standard one. We study the constraint preservation properties and stability of both schemes when constraint-preserving boundary conditions are specified. (Received September 20, 2007)