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Nicolae Tarfulea* (tarfulea@purduecal.edu), Purdue University Calumet, Department of Mathematics, 2200 169th Street, Hammond, IN 46323. *On Differential Equations with Constraints*. Preliminary report.

In this talk we address the initial and initial-boundary value problems for differential equations with constraints. Under certain compatibility conditions, the constraints are preserved by the evolution for the initial value problem. However, for an initial-boundary value problem, this will not be the case. It has become increasingly clear that in order for constraints to be preserved during evolution, the boundary conditions have to be chosen in an appropriate way. Finding such boundary conditions is not an easy task, but it is essential for computing accurate numerical solutions. Here we consider boundary conditions for a first order hyperbolic system which are well-posed, and establish a sufficient condition for them to be constraint-preserving. Our condition is based on a second, extended system which we construct, and which we show is equivalent to the original one when the boundary conditions are constraint-preserving. We believe that for the extended system it will be easier to control constraint violations during numerical simulations because of the way that the constraints directly enter the evolution, and so it may present a preferable alternative to the original system for numerical approximation. This is a joint work with Douglas N. Arnold, University of Minnesota. (Received August 22, 2011)