1135-83-2251 **P. P. Yu***, 501 Westminster Ave., Fulton, MO 65251. *Lagrange reduction of the variational principle for Einstein's equations.* Preliminary report.

Lagrange reduction of the variational principle is applied to study the infinite-dimensional geometry in the constrained dynamics of Einstein's vacuum gravitational field equations. A degenerate Lagrangian invariant under groups of spatial diffeomorphisms and relativistic time translation is constructed on a principle bundle over the configuration space of Riemannian metrics on a spatial hypersurface in the space-time. With a natural choice of connection and homogenization in the time variable, variations of the reduced Lagrangian are carried out in the associated adjoint bundle. It is shown that vertical Lagrange-Poincare equations arising from variations in the shift vector field and the lapse function yield the diffeomorphism and Hamiltonian constraints as conservation laws whereas horizontal Lagrange-Poincare equations take the form of the reduced Einstein equations free of constraints. The Lagrange equations of evolution for given Cauchy data satisfying the constraints are obtained by the horizontal lift of the reduced Einstein equations. (Received September 25, 2017)